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# USSR Report

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USSR REPORT  
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BIOMEDICAL AND BEHAVIORAL SCIENCES

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MICROBES AND GRAIN CROP HARVESTS

Saratov STEPNYYE PROSTORY in Russian No 7, Jul 85 pp 20-22

LIFANOV, V., journalist

[Abstract] One of the primary concerns of the Saratov Institute of Plant and Microbial Biochemistry and Physiology of the USSR Academy of Sciences is the improvement of grain crops in the Volga area. To that end, as explained by the director of the Institute, Professor V. V. Ignatov, exciting research is being conducted on the identification and isolation of nitrogen-fixing bacteria and other microbes that may function in symbiosis with such plants. The purpose is to reproduce in other plant-microbe systems the symbiotic relationship prevailing between legumes and nitrogen-fixing bacteria. In addition to the USSR, such research is being actively pursued in the USA, Brazil, Canada, and FRG. Despite their varied backgrounds, all scientists agree that once such systems are put into effect, the benefits to grain culture and mankind are inestimable. However, the first order of business is to obtain a full understanding of the complexities of plant-microbe interrelationships, involving as they do plant immunity, and plant and microbe biochemistry and physiology and their respective metabolic products, and the effects that they exert on the other organism. Some of the scientists that have thrown themselves whole heartedly into this research at the Institute are Olga Nikolayevna Trunova, Lidiya Stepanovna Fedorova, Igor Mikhaylovich Skvortsov, Valentina Yevgenyeva Nikitina, Nikolay Grigoryevich Khlebtsov, and many others.  
[176-12172]

## EXPRESSION OF WHEAT AND RYE GENOMES IN TRITICALE

Minsk DOKLADY AKADEMII NAUK BSSR in Russian Vol 29, No 9, Sep 85  
(manuscript received 7 Dec 84) pp 846-848

VECHER, A. S., academician, BSSR Academy of Sciences (deceased), BULKO, O. P.,  
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Experimental Botany imeni V. F. Kuprevich, BSSR Academy of Sciences

[Abstract] The basic cytological and molecular-genetic effects of the development of interaction and of the expression of parent genomes of wheat and rye in triticale are presented. Two varieties of wheat and three varieties of rye were crossed to obtain three varieties of triticale. In all cases, the weight of 1000 grains of wheat exceeded that of the rye; two of the triticale varieties significantly exceeded the wheat (the third was within 2%). In contrast, the germ weight of the rye varieties exceeded the wheat in all cases (two of the triticale varieties were significantly above that), and the quantity of germ cells in the rye was significantly higher than for either the wheat or the triticale. The allopoloid genome of the wheat had 1.5-2 times more DNA than the diploid genome of the rye varieties. The DNA of the triticale was more nearly homologous with the wheat than the rye, with G-C pairs varying from 35-42%. Several strains of triticale from Mironovskaya 808 wheat and Chulpan rye were studied for their productivity. In all cases, they showed a higher count of grains per spike than wheat and a higher grain weight than rye. Overall, these methods facilitate the development of high-yield varieties of triticale and provide an experimental basis for selecting the parent wheat and rye varieties for achieving best results. References 13: 1 Czech, 11 Russian (1 Belorussian), 1 Western.

[131-12672]

/9835

UDC 547.917+632.4

LIPOPOLYSACCHARIDES OF MARINE BLUEGREEN ALGAE

Tashkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 4, 1985  
(manuscript received 17 Sep 84) pp 493-496

MIKHEYSKAYA, L. V., OVODOVA, R. G. and OVODOV, Yu. S., Pacific Ocean Order of the Red Banner of Labor Institute of Bioorganic Chemistry, Far Eastern Scientific Center, USSR Academy of Sciences, Vladivostok

[Abstract] Marine bluegreen algae have recently been identified as a promising source of lipopolysaccharides (LPS) possessing high antigenicity and low toxicity. To further define the algal LPS molecules and compare them with bacterial LPS complexes, standard chemical techniques were employed in their analysis. The LPS entities isolated from *Oscillatoria hildebrandtii* and *Nostoc* sp. contain heteropolysaccharides in which the rhamnose residues in *O. hildebrandtii* are incorporated into the carbohydrate chain via 1,3-linkage and contain substituents on C-2. In the *Nostoc* sp. the rhamnose residues are linked by 1,2- and 1,3-glycosidic bonds. In both genera the lipid component consists of palmitic and stearic acids, as well as glucosamine and glucose. In terms of their monosaccharide composition the LPS complexes were similar to those derived from gram-negative bacteria, but differ from the latter in a lower content of lipid component and absence of beta-hydroxy acids. References 7: 3 Russian, 4 Western.  
[146-12172]

UDC 547.953:665.37

SYNTHESIS OF HEXAPEPTIDE 11-16 OF HUMAN CALCITONIN

Tashkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 4, 1985  
(manuscript received 29 Oct 84) pp 555-558

KARELSKIY, V. N., KRYSIN, Ye. P., ROSTOVSKAYA, G. Ye., ANTONOV, A. A. and SMIRNOV, M. B., All-Union Scientific Research Institute of Blood-Substituent Technology and Hormonal Preparations, Moscow

[Abstract] Modification of standard peptide chemistry was employed in the two-state synthesis of hexapeptide 11-16 of human calcitonin, with the use

of N-carboethoxy-2-ethoxy-1,2-dihydroquinoline as the condensing agent in the individual steps. The synthetic approach consisted of the individual synthesis of the tripeptides 11-13 and 14-16 individually, followed by azide condensation of the tripeptides to yield the hexapeptide ThrTyrGlnAsp(OtBu)-PheN<sub>2</sub>H<sub>3</sub>. References 6: 2 Russian, 4 Western.  
[146-12172]

UDC 577.112.5

#### PRIMARY STRUCTURE OF $\gamma$ -SUBUNIT OF GTP-BINDING PROTEIN OF BOVINE RETINA

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 11, No 10, Oct 85  
(manuscript received 12 Apr 85) pp 1301-1314

OVCHINNIKOV, Yu. A., LIPKIN, V. M., TELEZHINSKAYA, I. N., SHUVAYEVA, T. M., OBUKHOV, A. N., ISHCENKO, K. A. and SHEMYAKIN, B. B., Institute of Bioorganic Chemistry imeni M. M. Shemyakin, USSR Academy of Sciences, Moscow

[Abstract] Standard peptide chemistry was employed in an analysis of the primary structure of the  $\gamma$ -subunit of the GTP-binding protein isolated from the bovine retina. Tabular data are presented on the sequence of the 69 amino acids in the chain. A unique feature of the  $\gamma$ -chain is the fact that a disulfide bond exists between two adjacent cysteine moieties--Cys<sup>35</sup>-Cys<sup>36</sup>. This appears to impart unique conformational characteristics to the  $\gamma$ -subunit, possibly resulting in a  $\beta$ -fold at that site. Figures 7; references 11: 4 Russian, 7 Western.  
[172-12172]

UDC 577.152.311.042:577.112.4.088.6

#### TRITIATED N,N-DIMETHYL-2-PHENYLAZIRIDINIUM: SYNTHESIS AND REACTION WITH ACETYLCHOLINESTERASE

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 11, No 10, Oct 85  
(manuscript received 18 Apr 85) pp 1348-1352

PALUMAA, P. Ya., RAYDARU, G. I., YARV, Ya. L., SHEVCHENKO\*, V. P. and MYASOYEDOV\*, N. P., Tartu State University; \*Institute of Molecular Genetics USSR Academy of Sciences, Moscow

[Abstract] High specific radioactivity (1.06 TBq/mmol) tritiated N,N-2-phenylaziridinium (I) was synthesized to study the specifics of the interaction of this inhibitor with cobra (*Naja naja oxiana*) venom acetylcholinesterase (AChE). Using previously described methodology, two molecules of I were found to bind to AChE. The first molecule of I reacted rapidly with a rate of  $(2.4 \pm 0.8) \times 10^{-3} \text{ sec}^{-1}$  without inactivation of AChE, whereas the second molecule bound more slowly  $(3.2-3.7) \times 10^{-5} \text{ sec}^{-1}$  with inactivation.

Evidently, two binding sites are involved. The first at some distance from the catalytically active site, while the second is in close proximity to that site. Since both native and I-modified AChE eluted in the same peak from Sephacryl S-300 column with a MW of  $63 \pm 4$  daltons, it appears that covalent modification of AChE with I did not lead to loss of peptide fragments from the enzyme. Figures 1; references 16: 3 Russian, 13 Western.  
[172-12172]

UDC 577.113.6:542.95

#### USE OF PHOSPHOMORPHOLIDITES IN SYRINGE SOLID-PHASE SYNTHESIS OF OLIGODEOXY-RIBONUCLEOTIDES

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 11, No 10, Oct 85  
(manuscript received 25 Jan 85; in final form 25 Mar 85) pp 1361-1366

KARPYSHEV, N. N., YASTREBOV, S. I. and POPOV, S. G., All-Union Scientific Research Institute of Molecular Biology, Koltsovo, Novosibirsk Oblast

[Abstract] Modifications were introduced into the syringe method of solid-phase synthesis of deoxyribonucleotide oligomers, primarily consisting of the use of stable and chromatographically pure phosphormorpholidites [Letsinger, RL, et al., Tetrahedron Lett. 40(1): 137, 1984]. Additional modifications involved the use of a Soviet silica gel (Silakhrom) as the solid matrix to which 5'-dimethoxytritylnucleosides are anchored via succinylaminopropyl couplers. The method was found suitable for the synthesis of 15-18 nucleotide-long oligomers without precautions to exclude air from the reactor. Figures 3; references 14: 2 Russian, 12 Western.  
[172-12172]

UDC 547.915.5

#### INTERACTION OF HEMOGLOBIN WITH PHOSPHOLIPID VESICULAR MEMBRANES: EFFECTS OF PHOSPHOLIPID COMPOSITION

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 11, No 10, Oct 85  
(manuscript received 5 Mar 85; in final form 6 May 85) pp 1385-1390

BONDARENKO, S. V., USHAKOVA, I. P., LEVIT, L. F., SEREBRENNIKOVA, G. A. and YEVSTIGNEYEVA, R. P., Moscow Institute of Fine Chemical Technology  
imeni M. V. Lomonosov

[Abstract] In order to define the optimal conditions for the preparation of hemosomes (liposomes with encapsulated hemoglobin), a study was made of the effects of phospholipid composition of erythrocyte membrane lipids on the



efficiency of hemoglobin incorporation and its conversion to oxyhemoglobin. Using vesicles prepared by ultrasonic dispersion and human hemoglobin, resulted in the demonstration that negatively charged phospholipids, such as phosphatidylserine and phosphatidic acid and leads to a marked increase in hemoglobin uptake. Sphingomyelin, however, was less effective in enhancing hemoglobin incorporation. Vesicles containing 10-15% phosphatidylserine contained less than 10% methemoglobin after 45-50 days of storage, whereas vesicles prepared from pure phosphatidylserine resulted in rapid destruction of hemoglobin with loss of the heme moiety. Inclusion of cholesterol and dipalmitoylphosphatidylcholine in the vesicles stabilized the membranes to the effects of serum factors and the level of oxyhemoglobin. Figures 4; references 27: 6 Russian, 21 Western.  
[172-12172]

UDC 577.352.332:57.086.3

#### STRUCTURAL SIMILARITIES BETWEEN RAPID SODIUM CHANNELS AND ACETYLCHOLINE RECEPTOR

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 2, No 10, Oct 85  
(manuscript received 13 May 85) pp 957-961

OVCHINNIKOV, Yu. A., DEMIN, V. V., GRISHIN, Ye. V. and SPADAR, S. N.,  
Institute of Bioorganic Chemistry imeni M. M. Shemyakin, USSR Academy of Sciences, Moscow

[Abstract] Electron microscopy in combination with digital image processing was employed in an analysis of the structural features of rat brain rapid sodium channels in the solubilized state and after reconstruction in a bilayer lipid membrane. Analysis of the solubilized protein preparation revealed two types of structures: a rod-like formation about 85 Å long (greater than the thickness of a lipid bilayer) which narrows at one of its ends, and square-type particles forming a rosette-formation. The center of the rosette appears to be ca. 20 Å in diameter; the external diameter of the rosette is ca. 50 Å and corresponds to the wide end of the rod-like structure. An additional type of rosette was also observed with an outer diameter of ca. 40 Å, and which corresponded in size to the narrow end of the rod-like structure. Since similar structures were observed in sodium channels in reconstructed bilayer lipid membranes, a scheme was devised to represent a sodium channel across a biological membrane. Similarity between sodium channels and acetylcholine receptors is suggested by the ca. 50 Å opening, which is similar to membrane projections of such receptors. Figures 3; references 11: 2 Russian, 9 Western.  
[174-12172]

## COVALENT CHROMATOGRAPHY IN STUDIES ON STRUCTURE OF MEMBRANE PROTEINS

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 2, No 10, Oct 85  
(manuscript received 27 Jun 85) pp 962-975

OVCHINNIKOV, Yu. A., ABDULAYEV, N. G. and BOGACHUK, A. S., Institute of Bioorganic Chemistry imeni M. M. Shemyakin, USSR Academy of Sciences, Moscow

[Abstract] Further expansion is provided on the use of CPG/Thiol (USA) porous glass for covalent chromatography of hydrophobic membrane proteins [Abdulayev, N. G., Et al., Biochem. Int., 5(6): 693, 1982]. The present study on amino acid sequencing was applied to rhodopsin and bacteriorhodopsin immobilized on the glass via thiol-disulfide exchange. Such an approach has the advantage of minimizing protein aggregation and facilitates resolution of the peptides into cysteine-containing and noncontaining fractions. Since bacteriorhodopsin does not contain cystine or cysteine moieties, sulfhydryl groups were introduced into the lysine residues to provide anchoring sites. Specific sequencing methods with rhodopsin and bacteriorhodopsin demonstrated the extent to which covalent chromatography on the thiol glass facilitates lipid elimination and enzymatic and chemical hydrolysis of proteins, with ready determination of the location of disulfide bridges. Figures 8; references 31: 5 Russian, 26 Western.  
[174-12172]

## TRANSMEMBRANE TRANSFER OF ENZYMES RENDERED PARTIALLY HYDROPHOBIC

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 2, No 10, Oct 85  
(manuscript received 30 May 85) pp 985-995

KABANOV, A. V., NAMETKIN, S. N., LEVASHOV, A. V. and MARTINEK, K., Moscow State University imeni M. V. Lomonosov

[Abstract] An effective method was devised for transforming hydrophilic proteins into hydrophobic molecules by the addition of fatty acid residues to the lysine moiety. Experimental details are provided for rendering alpha-chymotrypsin and trypsin hydrophobic by reaction with stearyl chloride in a system of inverse micelles of the sodium salt of di-2-ethyl-hexyl sulfosuccinate in octane. The resultant enzymes contained 1-2 fatty acid residues per molecule and retained full catalytic activity. Studies with spherical lipid membrane prepared from egg lecithin in octane and liposomes demonstrated that such proteins underwent transmembrane transfer. The conjugated fatty acid residues evidently formed anchoring points for attachment of the modified enzymes, as the native enzymes were not transferred. Figures 6; references 47: 19 Russian, 28 Western.  
[174-12172]

# ALTERATION OF ANTIGENIC DETERMINANTS OF BLOOD GROUP B SUBSTANCE BY $\alpha$ -GALACTOSIDASE

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 285, No 2, Nov 85  
(manuscript received 27 May 85) pp 475-477

BEZBORODOV, A. M., ULEZLO, I. V., ZAPROMETROVA, O. M., PRIYEZZHEVA, L. S.  
and KLIMOVA, K. N., Institute of Biochemistry imeni A. N. Bakh, USSR Academy  
of Sciences, Moscow; Scientific Research Institute of Hematology and Blood  
Transfusion, Leningrad

[Abstract] An analysis was conducted on the hydrolysis of  $\alpha(1\rightarrow3)$ -bound galactose residues of blood group B substance by an  $\alpha$ -galactosidase isolated from the micromycete *Cephalosporium acremonium*. Correlation between the degree of hydrolytic cleavage and the antigenic activity of the B determinant showed a corresponding loss of B antigenicity, and transformation of the B substance into an H substance. These observations provide an indication that such activity is not limited to the galactosidase activity possessed by the higher plants, but can also be exhibited by fungi. Figures 1; references 11: 2 Russian, 9 Western.  
[169-12172]

UDC 547.964.4.057:577.175.325'17.017

# SYNTHESIS OF [CYCLO(GLU $\gamma$ - $\epsilon$ LYS(GLY)-ACTH-5(5-14)-UNDECAPEPTIDE: BIOLOGICAL AND PHYSICOCHEMICAL CHARACTERISTICS OF ANALOGS OF ACTH-(5-10) AND -(5-14) PEPTIDES

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 11, No 9, Sep 85  
(manuscript received 3 Jan 85; in final form 22 Mar 85) pp 1157-1166

LIYEPKAULA, I. K., SKUINSH, A. A., ROMANOVSKIY\*, P. Ya., PORUNKEVICH, Ye. A.,  
RATKEVICH, M. P., VOSEKALNA, I. A., GAYLITE, Ye. A. and CHIPENS, G. I.,  
Institute of Organic Synthesis, Latvian SSR Academy of Sciences, Riga;  
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Riga

[Abstract] Studies were conducted on the biological and physical chemical characteristics of newly synthesized cyclic and linear analogs of ACTH: [cyclo(Glu $\gamma$ - $\epsilon$ Lys(Gly)ACTH-5(5-14)- and [Lys<sup>11</sup>(Gly)-ACTH-(5-14)-undecapeptides. Both azide and carbodiimide methods were employed in fragment condensation, with cyclization between the  $\gamma$ -COOH of glutamic acid and the  $\alpha$ -NH<sub>2</sub> groups of glycine (on the  $\epsilon$ -NH<sub>2</sub> of lysine) effected by diphenylphosphorylazide. Biological assays demonstrated that the melanocyte-stimulating activity of the cyclic analog was greater by two orders of magnitude than that of the linear precursor molecule, in frog skin models. However, studies with isolated adrenocortical rat cells showed that the steroidogenic potency of

the cyclic analog was weaker by an order of magnitude than that of the linear peptide. Analysis of CD spectra in water and trifluorethanol revealed considerable structural rigidity of both analogs. Fragment 11-14 was identified as the structure-forming element in both peptides responsible for the loop-like structure. Figures 5; references 15: 6 Russian, 9 Western. [170-12172]

UDC 547.964.4.057:577.175.829'17.017

SYNTHESIS AND BIOLOGICAL ACTIVITY OF CYCLIC AND LINEAR ANALOGS OF NEUROTENSIN C-TERMINAL FRAGMENT

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 11, No 9, Sep 85  
(manuscript received 3 Jan 85; in final form 8 Apr 85) pp 1167-1179

GRINSHTEYNE, I. V., MISINYA, I. P., VEGNER, R. E., VOSEKALNA, I. A., GAYLITE, E. A., GRIGORYEVA, V. D. and CHIPENS, G. I., Institute of Organic Synthesis, Latvian SSR Academy of Sciences, Riga

[Abstract] Solid-phase methodology was employed in the synthesis of linear and cyclic analogs of the C-terminal peptide sequence of neurotensin, in order to test them for biological activity since the vasodepressor and myotropic activity of neurotensin is concentrated in the C-terminal end. Cyclization was achieved either via pentafluorophenyl esters or diphenylphosphorylazide, involving the  $\epsilon$ -NH<sub>2</sub> group of lysine and the C-terminal COOH group, for which purpose the N-terminal arginine was replaced by lysine in the penta- and hexapeptides. The cyclic analog [Phe<sup>5</sup>]cyclo(13→6<sup>E</sup>)-NT-(5-13) was found to possess potent vasodepressor activity in in vitro rat trials, and demonstrated some selectivity for the ileal smooth musculature of the guinea pig. CD spectra of aqueous solutions of the peptides in question demonstrated that the linear penta- and octapeptide analogs exist in a folded conformation, while the structure of the (6-13) fragment of neurotensin is unordered. Cyclization of the latter fragment imparts marked structural rigidity. Figures 3; references 32: 6 Russian, 26 Western. [170-12172]



STUDIES ON SPATIAL STRUCTURE OF des-Gly<sup>9</sup>-[Arg<sup>8</sup>]-VASOPRESSIN BY TWO-DIMENSIONAL NMR SPECTROSCOPY AND THEORETICAL CONFORMATIONAL ANALYSIS

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 11, No 9, Sep 85  
(manuscript received 4 Feb 85; in final form 2 Apr 85) pp 1180-1191

SHENDEROVICH, M. D., SEKATSI, I. P., LIYEPINSH, E. E., NIKIFOROVICH, G. V.  
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of Sciences, Riga

[Abstract] Des-Gly<sup>9</sup>-[Arg<sup>8</sup>]-Vasopressin (DGAV) was subjected to two-dimensional NMR analysis in dimethylsulfoxide. The collated data included information on spin-spin interaction constants, the temperature factors ( $\Delta\delta/\Delta T$ ) for amide protons, and analyses of cross-peaks in Overhauser's nuclear effect in two-dimensional spectroscopy. The combination of two-dimensional correlational spectroscopy and nuclear effect spectroscopy indicated that definitive information on the spatial characteristics of DGAV can be derived from the low temperature factor of the amide proton of Asn<sup>5</sup> and the Overhauser nuclear effect between the  $\alpha$ -protons of the Cys<sup>1</sup> and Cys<sup>8</sup> residues. The relative temperature insensitivity of the chemical shift of the amide proton of Asn<sup>5</sup> indicates that this proton is shielded from the solvent. Shielding was attributed to a  $\beta$ -turn in the 2-5 residue fragment; the distance between the  $\alpha$ -protons of Cys<sup>1</sup> and Cys<sup>8</sup> was calculated as less than 4 Å. Theoretical analysis indicated that the cyclic part of DGAV apparently involves a type-III  $\beta$ -turn, with amino acids 3 and 4 occupying corner positions, and residues 1-2 and 5-6 forming the extended portions. Figures 3; references 35: 7 Russian, 28 Western.  
[170-12172]

## EXPANSION OF GEOMETRIC ALGORITHM FOR CALCULATION OF SPATIAL STRUCTURE OF PEPTIDE MOLECULES FROM NMR SPECTROSCOPIC DATA

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 11, No 9, Sep 85  
(manuscript received 4 Mar 85) pp 1192-1209

MAYOROV, V. N., ARSENYEV, A. S. and BYSTROV, V. F., Institute of  
Bioorganic Chemistry imeni M. M. Shemyakin, USSR Academy of Sciences,  
Moscow

[Abstract] An expansion of the geometric algorithm was employed for calculation of spatial features of the Ala<sup>13</sup>-Cys<sup>20</sup> sequence of I<sub>5</sub>A insectotoxin of *Buthus eupeus*, based on experimental data derived from NMR information on distance constraints [Braun, W. et al., Biochim, Biophys. Acta, 667(22): 377, 1981]. The basic NMR data dealt with spin-spin interaction constants for interaction of vicinal H-NC <sup>$\alpha$</sup> -H and H-C <sup>$\alpha$</sup> C <sup>$\beta$</sup> -H protons and deuterium



exchange among amide groups of the backbone chain. In addition, the spin-spin interaction constants were also employed for empirical calibration of the intensity of cross-peaks of the nuclear Overhauser effect. The expanded algorithm improved the precision of determination of the atomic coordinates to a mean-square deviation of 0.3 Å for atoms of the backbone chain and to 1.1 Å for all atoms in the molecule. Without consideration of the spin-spin interactions the respective mean-square deviations were 0.5 and 1.3 Å. Figures 4; references 35: 3 Russian, 32 Western.  
[170-12172]

UDC 577.113.6.083.3:543.544.42

#### USE OF PREPARATIVE REVERSE-PHASE HIGH PERFORMANCE LIQUID CHROMATOGRAPHY IN OLIGODEOXYRIBONUCLEOTIDE SYNTHESIS

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 11, No 9, Sep 85  
(manuscript received 13 Mar 85) pp 1220-1226

AZHAYEV, A. V., TURINA, O. V., GNUCHEV, N. V. and CHERNOV, B. K.,  
Institute of Molecular Biology, USSR Academy of Sciences, Moscow

[Abstract] Trials were conducted with the use of preparative, reverse-phase, high performance liquid chromatography (HPLC) in the separation of block polymers in the course of synthesis of a tetradeca primer--d(C-C-C-A-G-T-C-A-C-G-A-C-G-T)--used in DNA sequence. Standard phosphotriester technology was combined with reverse-phase HPLC using Zorbax ODS, Zorbax NH<sub>2</sub>, Lichosorb RP, Silasorb NH<sub>2</sub> and Hypersil ODS. Optimal recovery was obtained with Hypersil ODS with elution with a 6-30% gradient of methanol in 0.1 M ammonium acetate at 50°C. Although similar recovery of the target tetradecanucleotide was obtainable on regular chromatography on silica gel, the use of reverse-phase HPLC in the various operations decreased the operational time of the entire cycle to ca. 1.5 h. Figures 2; references 24: 3 Russian, 21 Western.  
[170-12172]

UDC 577.113.6

#### CHEMICAL SYNTHESIS OF SELECTED (2'→5') OLIGONUCLEOTIDE ANALOGS OF (2'→5')-OLIGOADENYLIC ACID

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 11, No 9, Sep 85  
(manuscript received 18 Mar 85) pp 1227-1238

KVASYUK, Ye. I., KULAK, T. I., KALINICHENKO, Ye. N., PODKOPAYEVA, T. L., MIKHAYLOPULO, I. A. and PFLEIDERER\*, W., Institute of Bioorganic Chemistry, Belorussian SSR Academy of Sciences, Minsk; \*Chemistry Faculty, University of Konstanz, West Germany

[Abstract] The phosphotriester, method was used in the synthesis of (2'→5')-oligonucleotide analogs of (2'→5')oligoadenylic acid. The analogs consisted

of adenosine, guanosine and/or deoxyadenosine residues, using a 1:3 mixture of quinoline-8-sulfochloride and 3-nitro-1,2,4-triazole for condensation. 3'-O-benzoyl served as the protective group for ribosides in view of its stability and ease of removal without migration of the internucleotide bond. Structural confirmation of the analogs was obtained with UV, CD and  $^1\text{H}$  NMR spectroscopies, indicating that such analogs may function as model compounds in studies on the binding and activation of ribonuclease L (F).  
References 42: 2 Russian, 40 Western.  
[170-12172]

UDC 577.113.6:547.963.32

#### CHEMICAL AND MICROBIOLOGICAL 5'-PHOSPHORYLATION OF (2'→5')-OLIGOADENYLATES

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 11, No 9, Sep 85  
(manuscript received 18 Mar 85) pp 1239-1247

KVASYUK, Ye. I., KALINICHENKO, Ye. N., KULAK, T. I., PODKOPAYEVA, T. L., MIKHAYLOPULO, I. A., POPOV\*, I. L., BARAY\*, V. N. and ZINCHENKO\*, A. I.,  
Institute of Bioorganic Chemistry, Belorussian SSR Academy of Sciences, Minsk; \*Institute of Microbiology, Belorussian SSR Academy of Sciences, Minsk

[Abstract] Comparative studies were conducted on chemical and microbiological 5'-phosphorylation of (2'→5')trimers of adenylic acid. For the chemical phosphorylation the substrates consisted of protected (2'→5')trimer and the 3'-deoxyanalog, with selective deblocking of the terminal 5'-hydroxyl group. Chemical phosphorylation was carried out with phosphorus oxychloride, pyrophosphoryl chloride, or 2-cyanoethyl phosphate, yielding 5'-monophosphates after deblocking. Analogous 5'-monophosphates of the (2'→5')trimers and the 3'-deoxyanalog were synthesized by the phosphotransferase reaction carried out by intact *Erwinia herbicola* 74/3 cells, using p-nitrophenyl phosphate as the donor of the phosphate group. The phosphotransferase reaction was most efficient with the monomer, and progressively less efficient with the (2'→5')dimers and trimers. In addition, compounds lacking a 3'-hydroxyl group were less efficient substrates than adenosine and its (2'→5')oligomers. Figures 1; references 30: 5 Russian, 25 Western.  
[170-12172]

SIMPLIFIED SYNTHESIS OF BENZYL-2-ACETAMIDO-4-O-(2,3,4-TETRA-O-ACETYL- $\beta$ -D-GALACTOPYRANOSYL)-6-O-BENZYL-2-DEOXY- $\alpha$ -D-GLUCOPYRANOSIDE (I)

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 11, No 9, Sep 85  
(manuscript received 21 Mar 85) pp 1253-1255

BOVIN, N. V., KORCHAGINA, Ye. Yu. and KHORLIN, A. Ya., Institute of  
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Moscow

[Abstract] A simplified approach is described for the synthesis of I, which can serve as a convenient precursor for several natural oligosaccharides ( $Le^x$ ,  $Le^x$ , ABH (type 2),  $P^1$ ). The basic reaction consists of glycosylation of benzyl-2-acetamido-6-O-benzyl-2-deoxy- $\alpha$ -D-glucopyranoside with aceto-bromogalactose in the presence of silver triflate, which occurs at position 4. The (1 $\rightarrow$ 3) isomer of I is formed in a yield of 7%, and the (1 $\rightarrow$ 4) isomer of I in a 49% yield. The latter, with a free hydroxyl group at carbon 3, can be used as a direct precursor for the synthesis of the  $Le^x$  trisaccharide which functions as an antigenic determinant of tumor-associated antigens. References 9: 2 Russian, 7 Western.  
[170-12172]

SYNTHESIS OF NEOGLYCOPROTEINS WITH (Gal $\beta$ 1-3GalNAc $\alpha$ 1-)Ser, Gal $\beta$ 1-3GalNAc $\alpha$ 1, Gal $\beta$ 1-3GalNAc $\beta$ 1 OR (GalNAc $\alpha$ 1-)Ser HAPTENIC GROUPS

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 11, No 9, Sep 85  
(manuscript received 21 Mar 85) pp 1256-1264

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[Abstract] Details are provided on chemical steps underlying the synthesis of synthetic antigens (neoglycoproteins) carrying the disaccharide group Gal 1-3GalNAc. The synthesized carbohydrate haptenic groups were then conjugated to diazotized bovine serum albumin or cytochrome c to yield proteins with haptenic determinants consisting of (Gal $\beta$ 1-3GalNAc $\alpha$ 1-)Ser, Gal $\beta$ 1-3GalNAc $\alpha$ 1, Gal $\beta$ 1-3GalNAc $\beta$ 1 or (GalNAc $\alpha$ 1-)Ser. Such derivatized proteins can then be used as synthetic congeners of the T antigens (Thompson-Friedenreich antigen), useful as markers of oncogenesis and differentiation. References 30: 6 Russian, 24 Western.  
[170-12172]

HETEROGENEITY OF LIPOPOLYSACCHARIDE-PROTEIN COMPLEXES IN YERSINIA  
PSEUDOTUBERCULOSIS

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 11, No 9, Sep 85  
(manuscript received 20 Dec 84; in final form 20 Mar 85) pp 1270-1275

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[Abstract] Sedimentation of lipopolysaccharide-protein (LPSP) complexes isolated from *Yersinia pseudotuberculosis* in cesium chloride gradient led to the demonstration of two components with buoyant densities of 1.40 and 1.43 g/cm<sup>3</sup>. Both components of the LPSP had identical qualitative composition in terms of monosaccharides, fatty acids and polypeptide mieties, but differed in the length of the O-specific chains. After dialysis of both forms, lyophilization and reconstitution, only one form was detected with a buoyant density of 1.41 g/cm<sup>3</sup>, indicating that hybridization had occurred. Immunochemical studies with rabbit antisera demonstrated that the 1.40 and 1.43 g/cm<sup>3</sup> forms of the LPSP complex shared common antigenic determinants. However, studies involving inhibition of antigen-antibody binding revealed fine antigenic differences, the nature of which remains to be elucidated. Figures 4; references 19: 2 Russian, 17 Western.  
[170-12172]

UDC 577.352.5:612.822

## ds-RNA AS A STIMULATOR OF CELL PACEMAKER ACTIVITY

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 284, No 6, Oct 85  
(manuscript received 25 Mar 85) pp 1499-1502

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[Abstract] Double stranded RNA (ds-RNA) is viewed as inducer of interferons and as a modulator of various biochemical reactions occurring in cells. ds-RNA was shown to be a stimulator of primary and secondary immune response. Even though RNA preparations are used in treatment of many diseases, their membrane mechanism of action is practically unknown. In the present paper it is shown that ds-RNA stimulates pacemaker activity of a cell by stimulating sodium pump work and by increasing the entrance of Ca<sup>++</sup> ions into the cell. More studies are needed, however, to explain which specific mechanism is responsible for this activating action of ds-RNA. Figures 3; references 13: 3 Russian, 10 Western (4 by Russian authors).  
[179-7813]

## INDUCED RESISTANCE OF INSECTS TO MICROBIAL PREPARATIONS

Vilnius TRUDY AKADEMII NAUK LITOVSKOY SSR: SERIYA V. BIOLOGICHESKIYE NAUKI  
in Russian No 1(89), May-Jun 85 (manuscript received 18 May 83) pp 62-67

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[Abstract] One of the big problems in the area of insect control is their ability to acquire resistance to chemical insecticides. The goal of this work was to study the possibility of the insects to develop resistance to microbial preparations. Experiments were done on caterpillars of wax moth (*Galleria mellonella* L) and cabbage white butterfly (*Pieris brassicae* L), exposing them to insecticides derived from *Bacillus thuringiensis*: entobacterin, dendrobacillin and bitoxybacillin. When sublethal doses of these preparations were used, the insects developed resistance to these agents during the first days after the exposure. This was manifested as a weak protective effect only against low doses of insecticides. The acquired immunity was shown by changed dynamics of the death of insects: they began to die later than controls, at a lower intensity and their survival rates were higher. When the protective effect was noticed, a second treatment with microbial preparations was advocated to be applied seven days after the first treatment. Figures ; references 16: 10 Russian, 6 Western.  
[1000-7813]

/9835



## BIONICS

### NEUROMUSCULAR SYSTEM STUDIES HAVE ROBOTICS APPLICATIONS

Moscow VECHERNAYA MOSKVA in Russian 1 Nov 85 p 2

[Text] Associates of the unique laboratory on movement-control processes at the USSR Academy of Sciences' Institute of Problems of Information Transmission are studying mechanisms of the neuromuscular system by which motor functions of humans and animals are accomplished. Robotics specialists have shown tremendous interest in data which associates of this laboratory have amassed.

Skeletal muscles of animals or humans are ideal models to imitate. They are unique and highly efficient drive mechanisms, abundantly equipped with sensitive transmitters which transmit to the central nervous system information on the length of muscles, their rates of contraction or stretching, and the magnitude of force they develop.

The laboratory's data are also of value to specialists who are studying questions of physical labor and sports.

(A photograph shows Candidate of Biological Sciences Yu. S. Levik, a junior science associate; and Andrey Polyakov, a student of the Moscow Physical-Technical Institute, studying contractile reserves of human skeletal muscle with laboratory equipment.)

FTD/SNAP/9835  
CSO: 1840/194

UDC 547.963.4:543.484

DETERMINATION OF DISPOSITION OF RETINAL SCHIFF BASE RELATIVE TO PURPLE  
MEMBRANE SURFACE BY SURFACE-ENHANCED RAMAN SPECTROSCOPY

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 2, No 10, Oct 85  
(manuscript received 13 Feb 85) pp 1003-1005

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[Abstract] Surface-enhanced Raman spectroscopy was employed in a study on Halobacterium halobium purple membranes to determine the topographic relationship between retinal Schiff base and membrane surface. In addition to the membranes similar, analyses were conducted on retinal analogs and chromoprotein analogs of bacteriorhodopsin adsorbed to silver electrodes and hydrosols. The data from the spectroscopic patterns indicated that the Schiff base was located 6-9 Å below the exterior surface of the purple membrane, and that the retinal fully retained its trans-configuration. These conclusions were in agreement with results derived previously from other physicochemical techniques, and provided the basis for a graphical depiction of the structural organization of bacteriorhodopsin in the purple membrane. Figures 8; references 50: 13 Russian, 37 Western.  
[174-12172]

UDC 577.352.26

AREA INCREASE IN TRILAMINAR STRUCTURES IN MONOLAYER FUSION OF LIPID  
MEMBRANES

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 2, No 10, Oct 85  
(manuscript received 18 Mar 85) pp 1048-1055

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[Abstract] An analysis was conducted on the effects of composition and solvent medium on the increase in the area of trilaminar structure resulting

from the monolayer fusion when two bilayer lipid membranes come in contact. The trilaminar structure is formed as a result of fusion of the monolayers facing each other of the two respective bilayer membranes, forming a single bilayer common to both. The rate of area increase was measured by changes in capacitance, using membranes formed from azolectin, phosphatidylethanolamine, yolk lecithin, and monooleoglycerol in n-decane or squalene. The highest rate of spread was seen with the monooleoglycerol membrane ( $9.5 \times 10^{11} \text{ m}^2/\text{sec}$ ), which also corresponds to the highest surface tension in n-decane ( $4.0 \text{ N/m}$ ). The rate of the spread of the trilaminar structure was thus correlated with the rate of spread of the lipid droplet in membrane formation, a process dependent on the redistribution of lipids between the bilayer and the meniscus. Friction between monolayers may also affect the rate of spread of the trilaminar structure, with an interlayer of n-decane favoring faster spread by diminishing the friction. Figures 5; references 10: 4 Russian, 6 Western.  
[174-12172]

UDC 588.391:547.963.3+611.438

#### TWO FORMS OF CELL DEATH: CYTOMETRIC AND BIOCHEMICAL ANALYSES

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 285, No 2, Nov 85  
(manuscript received 13 May 85) pp 451-455

AFANASYEV, V. N., KOROL, B. A., MANTSYGIN, Yu. A., NELIPOVICH, P. A., PECHATNIKOV, V. A. and UMANSKIY, S. R., Institute of Biological Physics, USSR Academy of Sciences, Pushchino, Moscow Oblast

[Abstract] A kinetic analysis was conducted on the breakdown of DNA and on changes in plasma membrane permeability in two forms of cell death: apoptotic and necrotic. For apoptosis, which commences with condensation of the nucleus and the entire cell, studies were conducted with Wistar rat thymocytes subjected to Cs-137 irradiation or glucocorticoids. Necrotic death was modeled on Burkitt's lymphoma cells (Raji line), and Chinese and Syrian hamster fibroblasts subjected to irradiation. Two types of DNA degradation were identified which corresponded to the two forms of cell death. In apoptosis early internucleosomal fragmentation of the chromatin preceded alterations in plasma membrane permeability. In necrotic-type-cell death, an increase in plasma membrane permeability preceded DNA degradation, the latter following a disordered course suggestive of hydrolase activation in the dead cells. Figures 3; references 15: 1 Czech, 3 Russian, 11 Western.  
[169-12172]

/9835

## BIOTECHNOLOGY

### USE OF PROCESSED ORGANIC WASTES AS FUEL

Moscow EKONOMICHESKOYE SOTRUDNICHESTVO STRAN-CH SEV in Russian No 7,  
Jul 85 pp 48-50

[Article by M. Rustamov, corresponding member of the Azerbaijan Academy of Sciences, and N. Muradov, candidate of chemical sciences: "Energy Plus Ecology"]

[Excerpts] Our country has at its disposal considerable fossil-fuel resources. The rate of industrial development and operation of deposits remain high and stable for us. For this reason, today we are not faced with the problem of reserves of natural fuels or, as it is sometimes not quite accurately called, the "energy crisis."

With the rising rate of production, subterranean resources of petroleum, gas and coal cannot be considered bottomless. The situation is also aggravated by the fact that these basic forms of fossil fuels are a most valuable raw material for the rapidly developing chemical industry, and they have to be preserved in this regard for future generations. Thus we have to concern ourselves in advance with the creation of a scientific and technical reserve of energy for the future on which the country's economic growth will largely depend. Basic ways of solving this problem have been determined. In particular, it is planned to increase in the national economy the scale of use of renewable sources of energy: solar, wind, geothermal and others. The development of these energy resources should gradually lead to the exclusion of natural fuels, first of all petroleum, from the sphere of energy production.

Whereas solar and wind energy are "popular" types of renewable energy resources, biomass, as a promising source of energy has come to be discussed relatively recently. The term biomass also includes wastes of animal-husbandry, the microbiological industry, city sewage and so forth. Achievements of modern biotechnology make it possible through processing of these wastes to solve in a trice several problems: production of liquid and gaseous fuel, fertilizers for agriculture, purification of sewage and conservation of the environment. Bioenergy installations (BEU) have become particularly widespread in the world for the production of biogas through fermentation of organic wastes of animal husbandry.

Well-proved in practice, bioenergy installations are of simple design. They are inexpensive and do not require any expenditures for operation. A basic component of a bioenergy installation is a methane tank--a container which

receives organic wastes and warmed water and where bioprocesses take place with formation of biogas. The amount of biogas depends primarily on the composition of the raw material. On the average, it amounts to 400 cubic meters of gas per ton of wastes. For example, for an animal-husbandry complex of 500 head of cattle, biogas productivity of the bioenergy device amounts to more than 100 tons of standard fuel a year and for a poultry-breeding complex of 100,000 hens--almost 900 tons of standard fuel a year. Biogas is a high-caloric, ecologically clean fuel and consists of 70 percent of methane and 30 percent of carbon-dioxide gas.

An important successful achievement of biogasification is the possibility of using the residue formed in methane tanks. This is a disinfected, highly-effective fertilizer which in its properties approximates nitrofoska. It has been experimentally proved that fertilizer produced as the result of biogasification of wastes exceeds in effectiveness that obtained ordinarily with the composting method. This is probably due to the fact that in fermentation of nitrogen, phosphorus and other elements assume a form that is better assimilated by plants. Of exceptional importance is the sanitary role of bioconversion of wastes, inasmuch as in fermentation harmful microflora and pathogenic microbes are destroyed. The economic effect of biogasification of wastes is dual: on the one hand, use of biogas as a fuel releases additional amounts of petroleum-gas fuel in short supply and on the other, the use of fertilizers produced from the residue increases the yield of agricultural crops.

According to certain estimates, the effect of use of biogas as a fuel amounts to 140 rubles per 1,000 cubic meters, while the relative annual national effect amounts to as much as 95 rubles per head of cattle annually. If by the year 2000, bioprocessing of organic wastes occurs only on a quarter of the respective farms of the republic (and this is quite realistic), this would provide a saving of petroleum and gas of up to 300,000 tons of standard fuel a year. On the scale of the country, the economic effect will amount to approximately 5 billion rubles a year. Thus, wide-scale use in the republic's economy of processes of bioconversion of agricultural wastes will make it possible to solve a number of very important problems: provision of energy, additional food products and conservation of the environment. Unfortunately, such glowing prospects are as yet of little concern to most people. The republic's Ministry of Agriculture and other ministries and institutions do not give the necessary consideration to effective complex utilization of organic wastes. Of course, it is not the most important problem facing them today, but it is clear that it is necessary already now to involve interested organizations in the problem. Scientific and experimental projects already exist in the country. In a number of cities, large-scale bioenergy installations are in operation and biogas is used in addition to natural gas. Rather large installations will be constructed in the immediate future for bioconversion of animal-husbandry complexes in the RSFSR, in the Ukraine and in Latvia, Estonia and Turkmenia. The problem of rational use of biomass as an ecologically clean energy source and as fertilizer are also most pertinent for our republic.

7697

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CONCENTRATION, EXTRACTION AND PURIFICATION OF PRODUCTS OF MICROBIOLOGICAL SYNTHESIS

Moscow MIKROBIOLOGICHESKAYA PROMYSHLENNOST: EKSPRESS-INFORMATSIYA in Russian No 7, Jul 85 pp 4-8

[Article reviewed by Ye. S. Drygina: "Processes and Equipment of the Microbiological and Hydrolytic Industries", summaries of reports of the All-Union Conference, "Concentration, Extraction and Purification of Products of Microbiological Synthesis", Odessa, M., 1985 (All-Union Scientific Research Institute of Control Systems, Economic Research and Scientific and Technical Information of the Microbiological Industry, VNIISNTI)]

[Text] When designing equipment for concentrating products of microbiological synthesis the most practicable and promising areas under the conditions in the domestic machine building industries are: the creation of yeast separators with a system of in-place washing with a productive capacity of 50-100 m<sup>3</sup>/hr; the development of self-discharging separators of explosion-proof design with a productive capacity of 1.5-2 m<sup>3</sup>/hr for enzyme solutions;

the development of stages of preparation of suspensions including preliminary filtering of the nutrient media and water. The creation of a filter for purifying the suspension, with a productive capacity of up to 300 m<sup>3</sup>/hr, for the purpose of preventing wear and tear on the separators and increasing their operating time between washings;

the development of self-discharging separators--bactofuges with a productive capacity of 3 m<sup>3</sup>/hr of enzyme solution;

the creation of unitized equipment for baromembrane processes suitable for the microbiological industry;

the creation of equipment and layout of units for concentration suitable for processes used to obtain amino acids such as lysine, algae, enzymes, bacteria preparations and feed protein.

The physical and chemical characteristics of microbe suspensions determine the direction of the development of a system of intensive methods of separation and of the principles of its structure:

- differentiation of the conditions of separation of microbe suspensions;
- completeness of methods based on combining separate procedures;
- combination of methods of separation with modification of the culture media;
- use of selective methods.

Taking into account these principles, a technique of foam concentration was developed at the All-Union Scientific Research Institute of Protein Synthesis, based on a combination of foaming and flotation in the process of microorganism cultivation.

In the system of methods of extraction and concentration developed at the institute, nonprecipitated filtration in a centrifugal field (NFCF) is of particular importance as the most universal method which ensures the efficient separation of various microbe suspensions (micellar, yeast, bacterial) with significant economy of labor and energy. Research was carried out which allowed the substantiation of the development of a group of apparatuses for NFCF with a productive capacity of 0.01 to 100 m<sup>3</sup>/hr and higher. Experimental apparatus with a productive capacity of 0.2 m<sup>3</sup>/hr for the yeast suspension was manufactured and tested.

In the system, the development of methods for purifying the produced culture liquids is stipulated to decrease loss of the product and to prepare it for subsequent intensive purification, as well as the use of methods of selective extraction of components of the culture liquid based on the use of membrane technology (ultra- and microfiltration and reverse osmosis). The introduction of the developed system will, through the use of domestic technology, solve the problem of full extraction, without loss, of the valuable products of metabolism.

A promising method for separating the components of biological synthesis has been developed at the All-Union Scientific Research Institute of Particularly Pure Biopreparations. In order to increase the resolution of the process at moderate speeds of centrifugal flow, a pulsed operation of microfiltration has been proposed, the essence of which is in conveying to the membrane not a constant, as in the usual methods, but a pulsed pressure differential. In this case, the filtration process is characterized by alternating the work period ( $t_1$ ) when the pressure differential is in effect and filtration takes place in accordance with the usual mechanism, and a regeneration period ( $t_2$ ) in which only the centrifugal flow is in effect. Selecting the size of  $t_1$  in such a way that it is considerably less than the period in which a thick polarized layer forms, it is possible to stabilize the process with parameters close to the initial ones. As a result, finely dispersed components (FDC) are practically never trapped by the membrane and the productive capacity does not significantly decrease.

It was determined that the pulsed operation of microfiltration allows the delay coefficient of FDC to be decreased to 0-0.1 in comparison with 0.6-0.9 for the usual operation. Such a decrease permits a significant increase in the efficiency of the purification.

The membrane method of extraction and concentration is becoming more widely used due to the "soft" conditions of the process and the possibility of reducing energy and material costs. The flat-framed membrane apparatus with an area of 2 m<sup>2</sup> developed by the All-Union Scientific Research Institute of Antibiotics ensures 100% stability of the end product. The ultrafiltration installation includes units for feeding the nutritive and washing solutions which allows the process to be conducted almost continuously. The total operation time of the installation was approximately 100 hours. During this time the permeability of the membrane practically did not decrease in comparison with the initial value. Specially developed membranes from poly-1,3,4-oxadiazole allow protein mixtures to be almost completely removed from solutions of antibiotics, to decrease by several times the chromaticity of the solutions and prevent the formation of resistant emulsion during subsequent extraction.

At present, great significance is given to the problem of optimal control of the technological processes, in particular of the separation stage, since during extraction of the end product part of the yeast is lost with the flow of the culture liquid. At the All-Union Scientific Research Institute of Biotechnology a method has been developed for routine optimal control of a group of separators based on the use of a mathematical model for a group of apparatuses connected in parallel. Losses of end products were taken as criteria. The flow of liquid through the separator is the action controlled.

Introduction of the optimization method permits an increase in output of the end product, an increase in the efficiency and reliability of the detection of separators which must be stopped for washing and ensures that the optimal number of apparatuses are in operation. The method was verified under conditions of active large-capacity production and is recommended for the construction of an appropriate automatic technological process control system.

For industrial separation, purification and concentration of substances, the method of fractional crystallization from the film of a drained liquid is recommended (Institute of General Inorganic Chemistry imeni N. S. Kurnakov, USSR Academy of Sciences). The process unites the advantage of crystallization (low energy costs and temperatures) with the advantage of film thermal- and mass exchange apparatuses with a high productive capacity (higher than 10,000 t/hr) and with high efficiency of separation. The proposed method for calculating the effective coefficient of separation, velocity and critical length of crystallization makes it possible to determine the productive capacity and dimensions of the industrial apparatuses.

An efficient method for drying the thermolabile products of microsynthesis which tend to agglomerate was researched at the Kazan Institute of Chemical Technology. A method was proposed based on the multiple alternation of heating cycles, lowering of pressure during the first period of drying with subsequent increase in the intensity of the vacuum to the given value and agitation of the layer of material by means of contact of the sublayer area with the atmosphere. By lowering the pressure inside the cloddy, damp material, this drying method results in the emergence of a gradient of pressure, which is caused by intensive, filtered, diffusive and thermodiffusive flows of the liquid and paragas mixture from the center of the agglomerate to its surface. Crumbling and disintegration of the agglomerate occurs under the influence of internal stresses proportional to the gradient of pressure.

Experimental and industrial research of this drying method at the Frunzia Plant of Antibiotics allowed an increase in the drying process of amino acids of more than a factor of 10 and the procurement of a product of uniform structure from the whole mass of dried material.

A comprehensive approach to solving the problem of obtaining the end product was developed at the All-Union Scientific Research Institute of Protein Synthesis. In the industrial process for obtaining feed yeasts by cultivating them in purified n-paraffin oil simultaneously with feed biomass, lipids can be obtained whose composition includes a great amount of biologically active substances. A method was developed at the institute for extracting fatty acids from the lipids of yeast *Candida maltosa*. A technique has been proposed for obtaining products from microbe fat which are valuable to the national economy: concentrate of phospholipids, including lecithin; ubiquinone-9, monocarbonic fatty acids, rolling lubricants and others. Technical documents have been drawn up concerning the design of the pilot plant for ubiquinone-9.

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CSO: 1840/151

UDC /575:62/:578.245

HUMAN LEUKOCYTE INTERFERON ALPHA-2 OBTAINED BY MICROBIOLOGICAL SYNTHESIS

Moscow MIKROBIOLOGICHESKAYA PROMYSHLENNOST: EKSPRESS-INFORMATSIYA  
in Russian No 7, Jul 85 p 4

[Article reviewed by S. L. Niselevich: "Breeding of Microorganisms, Genetic Engineering", thematic-exposition plan, "Microbiological Industry" pavilion, USSR Exhibition of Achievements in the National Economy, 1985]

[Text] A preparation of interferon was first obtained in the USSR at the All-Union Scientific Research Institute of Genetics based on a strain of bacteria developed by methods of genetic engineering which carries a structural gene of interferon on a plasmid vector. Bacterial interferon is in every way identical to natural human interferon alpha-2. In 5-8 hours of fermentation, the strain-producer is capable of accumulating up to  $6 \times 10^{10}$  international units of interferon per liter of culture liquid.

The medicinal forms of the preparation based on interferon alpha-2 are intended for external and parenteral uses, they meet the stipulated requirements, have a wide spectrum of antiviral and antiproliferative activity and are distinguished by great stability during storage. Experimental batches of the preparation were produced at the Vilnyus Experimental-Industrial and Ladyzhinskiy Plants of Ferment Preparations.

12793/9835  
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## COLUMN-TYPE REACTOR FOR CONTINUOUS FERMENTATION OF HYDROLYSATES OF CELLULOSE-CONTAINING RAW MATERIALS IN ETHYL ALCOHOL

Moscow MIKROBIOLOGICHESKAYA PROMYSHLENNOST: EKSPRESS-INFORMATSIYA in Russian No 9, Sep 85 pp 14-15

[Abstract in Russian by Ye.A. Andreyeva, under the rubric "Commercial Ethanol, Methane, and Other Energy Bearers," of report by A.P. Sinitsyn et al. in "Tezisy dokladov u Vsesoyuznogo simpoziuma po inzhenernoy enzimologii (Polucheniye i primeneniye biokatalizatorov v narodnom khozyaystve i meditsine)" ["Report Theses at the All-Union Symposium on Engineering Enzymology (Obtaining and Applying Biocatalysts in the National Economy and Medicine)"], Olayne NPO "Biolar" Vol 1, 1985 p 286]

[Text] The possibility of effective use of a column-type reactor [reaction apparatus] with immobilized yeasts for obtaining ethanol from hydrolysates of cellulose-containing raw material (TsSS) [CCRM] has been shown at MGU [Moscow State University] imeni M.V. Lomonosov. *Saccharomyces cerevisiae* yeasts were immobilized by the adsorption method on aluminoborosilicate brushes placed in a column reactor. The concentration of moist yeasts in the reactor constituted about 0.3 g for 1 g of the support. A hydrolysate of CCRM with a 2.5 percent reducing agent concentration, containing xylose and glucose in a 1:5 ratio, was introduced into the reactor continuously. At a passage rate of 11.8 ml/h [milliliters per hour] and a working reactor volume of 12 cm<sup>3</sup>, the ethanol yield amounted to 1 percent, which is equal to 88.7 percent of the theoretical yield.

The productivity of the process reaches 8.9 g of ethanol at 1 liter per hour. Retention time of the CCRM hydrolysate in the reactor is decreased, and amounts to 1 hour, as compared to a retention time equal to 6-7 hours in the continuous industrial fermentation of hydrolysates in vats. An acidic hydrolysate produced at the biochemical plant in the city of Kirishi, from coniferous kinds of wood, is used for the fermentation.

12319

CSO: 1840/153

## OBTAINING ETHYL ALCOHOL BY MEANS OF IMMOBILIZED SACCHAROMYCES CEREVISIAE AND ZYMONONAS MOBILIS CELLS

Moscow MIKROBIOLOGICHESKAYA PROMYSHLENNOST: EKSPRESS-INFORMATSIYA in Russian  
No 9, Sep 85 p 15

[Abstract in Russian by Ye.A. Andreyeva, under the rubric "Commercial Ethanol, Methane, and Other Energy Bearers," of report by Ya.E. Blushoyerge et al. in "Tezisy dokladov u Vsesoyuznogo simpoziuma po inzhenernoy enzimologii (Polucheniye i primeneniye biokatalizatorov v narodnom khozyaystve i meditsine)" ["Report Theses at the All-Union Symposium on Engineering Enzymology (Obtaining and Applying Biocatalysts in the National Economy and Medicine)"], Olayne NPO "Biolar" Vol 1, 1985 p 285]

[Text] The continuous (for a period of 32 days) obtaining of ethanol in glucose media by means of *Zymomonas mobilis* and *Saccharomyces cerevisiae* immobilized in agar-agar gels has been investigated at the Latvian SSR Academy of Sciences Microbiology Institute imeni A. Kirkhenshteyn. The biomass concentrations in the gel at the start of the experiment constituted, respectively: 2.3 and 3.9 g/liter, at the end--75 and 69 g/liter, and the ratios of biomass quantities on the gel's surface to quantities within it--2.9 and 0.8. Productivities of the columns, calculated by their volumes in the course of the experiment, increased from 5 and 2 g to 25 and 14 g of ethanol at 1 liter per hour. The dynamics of pH change, biomass yields, glucose and ethanol concentrations, rate of CO<sub>2</sub> release, and the quantities of certain volatile fatty acids were determined; and an analysis of biomass distribution by height of columns was made. The obtained results permit drawing the conclusion that immobilization of *Z. mobilis* cells in agar-agar gel may be a future method for obtaining ethanol from glucose-containing media.

12319

CSO: 1840/153

SOVIET INDUSTRIAL MICROBIOLOGY EXPOSITION IN FINLAND

Moscow MIKROBIOLOGICHESKAYA PROMYSHLENNOST: EKSPRESS-INFORMATSIYA  
in Russian No 3, Mar 85 pp 6-7

[Abstract in Russian from a brochure--Vystavka MIKROBIOLOGIYA-CHELOVEKU  
(Microbiology and Man Exposition) in Helsinki. Theme-Exposition Plan,  
VNIISNTI, 1984]

[Text] The exposition was intended to display the achievements of Soviet science and technology in the areas of microbiology, to demonstrate its significance in implementing the program positions of the CPSU, and to contribute to broadening and deepening scientific and technical relations between the USSR and Finland.

The exposition was divided into the following categories:

1. characteristics of microbiological production, its advantages over traditional technology;
2. use of microbially synthesized products in different branches of industry and in medicine;
3. role of microbiology in implementing the Soviet Food Program;
4. selection and genetics, apparatus and equipment;
5. environmental conservation and wastefree production;
6. international scientific and technical collaboration (on the example of collaboration with Finland).

The exposition displayed 157 natural samples of primary microbially synthesized products and of other products derived from these, 57 charts and slides with color photo enlargements, graphs and text, a push-button lighted display [??], and 6 pieces of equipment used in scientific research. There were 3 glass cases containing 290 books on relevant topics, 46 brochures, and other scientific and technical information (reviews and the journal of the

VKhO [expansion unknown] im. D. I. Mendeleyev). Five filmstrips accompanied the exhibit: "Genetic Engineering at the Service of Production," "Microbiology and Agriculture," "The Microbiological Industry and Cattle-breeding," "Use of Microbially Synthesized Products" and "Biological Engineering."

At a press conference held at the opening of the exhibition the leader of the Soviet delegation, Corresponding Member of the USSR Academy of Medical Sciences V. I. Ogarkov, gave an address on the purposes and topics of the exhibition and the development of biological engineering in the USSR. The opening ceremonies were attended by over 200 scientists, specialists, directors of different firms and representatives of public organizations. The exhibition was visited by workers of Finland's State Center for Scientific and Technical Research, students and staff of Helsinki University, and workers from many firms, including "Rozenlev," "Tampella," "Suomi-Sokeri," "Sokeri-Kemiz," "Hankkiya," "Alko," "Kemira" and "Valio." Practically all organizations in any way connected with the topic of the exhibition were represented.

The most popular exhibits were on industrial production and the use of enzyme products, especially immobilized enzymes, in Soviet agriculture, on biologically active compounds, on genetic engineering products used for genetic manipulation (interferon, insulin, growth hormones, and the like), on the utilization of lignin, on the synthesis of ginseng, on the raw materials base for biological engineering, and on production volume for the individual products.

Within the framework of the exhibition, the members of the Soviet delegation became acquainted with the activity of the individual scientific organizations and firms of relevance for developing collaboration or establishing new scientific and technological relations.

The Soviet specialists visited several institutes and organizations involved in aspects of biological engineering.

The exhibition was a success and accomplished its primary goal of making known the achievements of the Soviet Union and expanding or establishing scientific and technological relations in the new and promising branch of biological engineering.

9832/9835  
CSO: 1840/149

## PRODUCTION AND PROCESSING OF MICROALGAE

Moscow MIKROBIOLOGICHESKAYA PROMYSHLENNOST: EKSPRESS-INFORMATSIYA  
in Russian No 3, Mar 85 pp 7-8

[Abstract in Russian of a brochure--Technology of Production and Processing of Microalgae, Moscow, Vneshtorgizdat, 1984]

[Text] A new technology, based on tubular-type photoreactors with a high (five to seven percent) efficiency of solar energy utilization, has been developed as an efficient process for the production of microalgae. The closed type of photoreactor eliminates contamination of the microalgal culture by other organisms from the environment and makes it possible to obtain a high-quality standard product under conditions of stable photosynthesis productivity (no less than 30 g/m<sup>2</sup> per light day). This means 60-65 tons of dry algae or 30-32 tons protein per hectare, which is 30-50 times the productivity of protein production from traditional agricultural crops.

The photoreactor may be a module of an industrial apparatus: one can choose from among individual modules an apparatus of the necessary productivity. It provides longterm use without shutdown or the need for manual labor to wash the internal surfaces of the tubes, which are cleaned by a special device during operation. The apparatus can be used to grow various forms of microalgae, both freshwater and saltwater (chlorellae, spirulina, scenedesmus, or monochrysis).

A technology developed for the waste-free processing of chlorella biomass can be used to obtain a high-quality protein hydrolysate for use in cosmetology as well as in the production of viral and bacterial nutrient media to replace protein substrates from nutritive raw materials (meat, fish, lactalbumin). The residue left after processing the chlorella contains no less than 20 percent nitrogen compounds in the form of free amino acids and peptides and can be used as a protein and vitamin supplement in feed for fish and agricultural animals.

A technology has been developed for obtaining a harmless nutrient product from spirulina biomass which can be used as a protein additive or a flavor enhancer.



The process for obtaining harmless standard products (microalgal biomass and secondary products) is based on the use of carefully monitored, highly productive selected strains of microalgae, and nutrient media prepared using cheap mineral fertilizers.

9832/9835

CSO: 1840/149

## AMINO ACID PRODUCTION

Moscow MIKROBIOLOGICHESKAYA PROMYSHLENNOST: EKSPRESS-INFORMATSIYA  
in Russian No 3, Mar 85 pp 13-14

[Abstract in Russian of a brochure--Method of Amino Acid Production, Moscow, Vneshtorgizdat, 1984]

[Text] A new efficient method has been developed in the USSR for obtaining L-lysine and L-glutamic acid, used in medicine, cattle-breeding, the food industry and for technical purposes, such as in the production of synthetic fibers.

The new method is based on microbiological synthesis using as a carbon source a mixture of hexose and pentose monosaccharides, hydrolysates from the growth medium, in contrast to known methods of obtaining amino acids by submerged fermentation using short-supply types of raw materials such as glucose, molasses, starch, etc. The new method uses, as raw materials, wastes from the wood-pulp industry or from agriculture: sawdust, wood shavings, corncobs, rice polishings, cottonseed hulls, or sunflower seed shells.

High efficiency is achieved thanks to the new organization of the engineering process and optimal production conditions for it.

The basic operations are hydrolysis, purifying the monosaccharide mixture of inhibiting impurities, enrichment with biogenic substances, nitrogen compounds and minerals, fermentation, and separating the high-quality product.

The new method makes it possible to use a cheap source of carbon, to accelerate the process of obtaining amino acids, to assure a high yield of the target product from the monosaccharide mixture--49.2 percent glutamic acid and 32.0 percent lysine--to improve product quality through the highly efficient purification of the monosaccharide mixture from impurities, to obtain a nonhygroscopic feed concentrates of L-lysine which does not cake during storage and to make complete and rational use of a plant material carbon complex to obtain protein and amino acids.

9832/9835  
CSO: 1840/149

## IMPROVING THE COMPREHENSIVE PRODUCT-QUALITY CONTROL SYSTEM

Moscow MIKROBIOLOGICHESKAYA PROMYSHLENNOST: EKSPRESS-INFORMATSIYA in Russian No 6, Jun 85 pp 4-6

[Abstract in Russian by Yu.Yu. Derbenev, L.A. Libit and T.V. Lebedeva, under the rubric "Managing Production, Scientific Labor Organization," of USSR State Committee for Standards recommendations: "KS UKP. Rekomendatsii po organizatsii rabot po sovershenstvovaniyu sistemy na predpriyatiyakh" ["The KS UKP: Recommendations for Organizing Work on Improving the System at Enterprises"], Moscow, Izdatelstvo standartov, 1985]

[Text] During the 11th 5-Year Plan, work was done in the microbiological industry on creating a product-quality control system at all levels of industry management. Introduction dynamics of the KS UKP [comprehensive product-quality control system] at Glavmikrobioprom [Main Administration of the Microbiological Industry] enterprises are presented in figure 1, and those for All-Union Industrial Associations in figure 2. By 1985, the system had been introduced at more than 75 percent of the industry's enterprises. The organizational and methods base for the KS UKP's operation has been formulated for the most part, and this is having a positive effect upon its accelerated introduction.

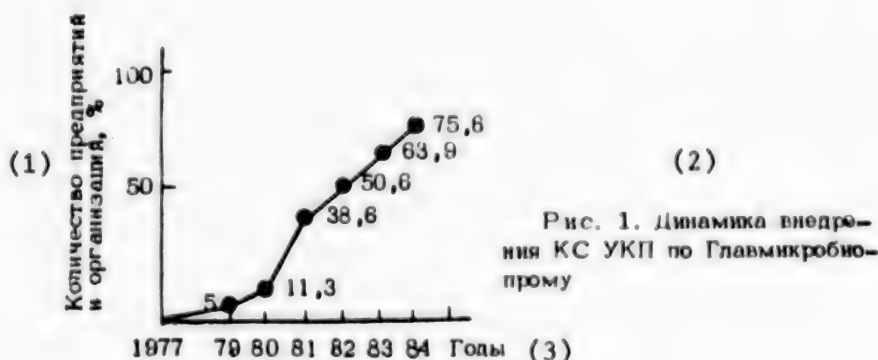


Figure 1. Dynamics of KS UKP Introduction for the Main Administration of the Microbiological Industry

Key:

1. Quantity of enterprises and organizations, in percentage
2. Russian caption for figure 1
3. Years

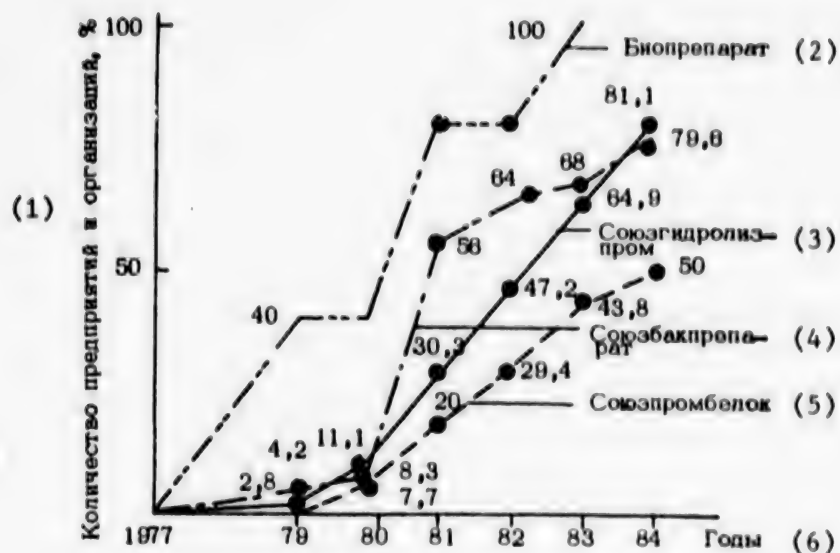


Figure 2. Dynamics of KS UKP Introduction for All-Union Industrial Associations

Key:

1. Quantity of enterprises and organizations, in percentage
2. All-Union Biological Preparations Association
3. All-Union Hydrolysis Industry Association
4. All-Union Bacteriological Preparations Association
5. All-Union Proteins Industry Association
6. Years

The system is subject to constant changes, depending upon the new purposes and tasks arising in economic and social development of the enterprises and organizations, All-Union Industrial Associations, and the industry as a whole, in which connection the need arises for its constant improvement. Work on improving the product-quality control system at enterprises and in the industry's organizations is being carried out along the following lines:

Reviewing and clarifying tasks in improving the microbiological industry's product quality;

clarifying the essence and composition of system functions according to the microbiological industry's development tasks for each planned period;

improving the industry's methods, forms and means of product-quality control.

For the purpose of creating an organizational and technical base for improving the KS UKP in 1985, the industry's enterprises and associations should develop a comprehensive plan for 1986 and the 12th 5-Year Plan, containing:

The enterprise's (association's) and its subdivisions' (enterprises', organizations') planned tasks;

a plan of the measures for material and technical, organizational, and labor support of product-quality improvement and the collective's social development.

Improving the KS UKP: The development of new documents (plant standards), or introduction of changes into the existing ones, depending upon newly arisen goals and tasks of the industry's, association's or enterprise's scientific and technical, economic and social development, is being carried out at a number of enterprises which already have introduced the system. The output volume of higher quality-category products (higher group, grade) is being stated more precisely, the time periods for mastering new products are being cut, and measures are being planned to reduce the numbers of poor-quality replacement demands and intraplant defective products.

After development of all documents and implementation of the measures intended as the technical task for improving the system, its adoption by the industry's commission will be arranged, with subsequent reregistration in Gosstandart [State Committee for Standards] agencies. In 1983 and 1984, 30 percent of the enterprises which introduced the KS UKP went through the system's reregistration.

Since the start of the system's introduction in the industry, the percentage of higher quality-category products in the overall volume of production increased to 27.6 percent (in 1984), and, in the volume of products subject to certification, to 42 percent. The protein content in yeasts from liquid petroleum paraffins increased to 62.3 percent, and in yeasts from plant raw materials--to 53.5 percent.

An appreciable economic impact was obtained at a number of the industry's enterprises from the KS UKP's operation, and instances of violation of technological discipline were reduced significantly. Production technology and organization are being improved constantly for the purpose of increasing product quality. Thus, at the Novopolotsk BVK [Protein and Vitamin Concentrates] Plant, merger of the biosynthesis shop with the nutrient-salts preparation shops and the biomass-concentration and finished-product drying shop was effected for the purpose of reducing excessive management levels and the share of overhead in product production costs. A raw-materials preparation and finished-product packaging and packing shop was created at the same plant to increase labor productivity.

A substantial part of the enterprises which have introduced the KS UKP has had no replacement demands from consumers for quality of produced products in the course of a number of years. These enterprises include, for example, the Omutninsk Chemical Plant, the Vyshnevolotskiy Ferment Preparations Plant, the Arkhangelsk Hydrolysis Plant, the Yefremov and Lotoshino Biochemical Plants, and others.

12319

CSO: 1840/150



## USING INFRARED RADIATORS FOR DETOXIFYING EXHAUST GASES IN MICROBIOLOGICAL PRODUCTION

Moscow MIKROBIOLOGICHESKAYA PROMYSHLENNOST: EKSPRESS-INFORMATSIYA in Russian No 6, Jun 85 p 15

[Abstract in Russian by Ye.A. Andreyeva, under the rubric "Purifying Sewage, Protecting the Environment, Utilizing Waste Products," of report by A.V. Sugak and M.A. Yablokova (Leningrad Technological Institute imeni Lensovet) in "Tezisy dokladov Vsesoyuznogo nauchno-tekhnicheskogo soveshchaniya 'Sozdaniye i vnedreniye khimicheskogo oborudovaniya s ispolzovaniyem fizicheskikh metodov intensivifikatsii tekhnologicheskikh protsessov'" ["Report Theses of the All-Union Scientific and Technical Conference 'Creating and Introducing Chemical Equipment Using Physical Methods of Technological Process Intensification'"], Moscow TsINTIkhimneftemash, 1984 p 59]

[Text] The traditional detoxification of technological gases exhausted from ferments is insufficiently effective because of the high moisture content. The use of infrared radiation permits achieving the rapid heating of drops to the destruction temperature of microorganisms (for plant cells of the Candida type, this is 100 degrees Celsius). Quartz lamps KG 220-1000, TEN's [tubular electric heaters], or a nichrome coil may be used as source of the radiation.

A mathematical model, applied on the basis of the theoretical dependencies that permit determining the time required for heating a drop of a certain size to cell-destruction temperature, has been developed. On the strength of calculating the length and heat effect of the infrared radiation zone, a laboratory installation has been designed, the operating principle of which is based on installing sources of infrared radiation (lamp KG 220-1000) along the axis of the ferment chamber's outlet pipe.

The prospects of using infrared radiation for detoxifying the gases are substantial. Recommendations are presented for constructing industrial devices.

12319

CSO: 1840/150

## ENGINEERING ENZYMOLOGY FOR CONVERTING CELLULOSE TO GLUCOSE

Moscow MIKROBIOLOGICHESKAYA PROMYSHLENNOST: EKSPRESS-INFORMATSIYA in Russian  
No 9, Sep 85 p 8

[Abstract in Russian by Ye.A. Andreyeva, under the rubric "Processes and Devices of Microbiological and Hydrolysis Production," of report by M.A. Rabinovich and A.A. Klesov in "Tezisy dokladov u Vsesoyuznogo simpoziuma po inzhenernoy enzimologii (Polucheniye i primeneniye biokatalizatorov v narodnom khozyaystve i meditsine)" ["Report Theses at the All-Union Symposium on Engineering Enzymology (Obtaining and Applying Biocatalysts in the National Economy and Medicine)"], Olayne NPO "Biolar" Vol 1, 1985 p 263]

[Text] At the USSR Academy of Sciences Biochemistry Institute imeni A.N. Bakh, a design has been developed for a continuous action counterflow column reactor [reaction apparatus] with the following zones: adsorption (for catching the emergent enzyme in newly entered raw material), hydrolysis proper and desorption of the enzyme from incompletely hydrolyzed remnants of raw material, and discharge of remnants. Due to this design, one batch of the enzyme can be used over a period of 1-1.5 months of continuous operation. Preliminary application of the culturing fluid to refrigerated raw material permits creating a high concentration of adsorbed cellulases in the column and, at the same time, cleansing them (by the affinity [afinnaya] chromatography principle) of accompanying impurities, including xylanases, which increases the quality of the hydrolysates and reduces the xylose content in them. Conditions are selected for adsorption of cellobiases in the reactor, and this makes it possible to free the syrup entirely of impurities. Glucose content in the hydrolysate reaches 12 percent. An experimental batch of glucose (10 kg), submitted for biological tests, has been obtained for the first time by this method. At present, a prototype installation, which will be started up at the end of 1985, is being constructed according to the given technology at one of the biochemical plants.

12319

CSO: 1840/153

## TECHNOLOGICAL BIOCATALYSTS ON BASE OF ORGANOMINERAL COMPOUNDS

Moscow MIKROBIOLOGICHESKAYA PROMYSHLENNOST: EKSPRESS-INFORMATSIYA in Russian  
No 9, Sep 85 pp 11-12

[Abstract in Russian by Ye.A. Andreyeva, under the rubric "Enzymes," of report by M.I. Kreen, E.N. Gzaro et al. in "Tezisy dokladov u Vsesoyuznogo simpoziuma po inzhenernoy enzimologii (Polucheniye i primeneniye biokatalizatorov v narodnom khozyaystve i meditsine)" ["Report Theses at the All-Union Symposium on Engineering Enzymology (Obtaining and Applying Biocatalysts in the National Economy and Medicine)"], Olayne NPO "Biolar" Vol 1, 1985 p 303]

[Text] A method is proposed for obtaining organomineral compounds of materials for use as technological biocatalyst supports. Macroporous materials are obtained from inexpensive domestic raw materials--silicon oxide, condensation polymerized resins--under easy technological conditions. In result of optimizing the composition of a compound and the technological parameters for obtaining it, supports have been developed which possess a specific surface of 30-40 m<sup>2</sup>/g, an overall pore volume of 0.8-1.0 cm<sup>3</sup>/g, and are not inferior to silochrome in binding capacity. The following immobilized enzyme preparations have been made on a base of these supports (Table).

PREPARATIONS	ACTIVITY		SUBSTRATUM
	Units/g	% from Native	
Alkaline protease of <i>Bacillus subtilis</i> (protosubtilin)	25-40	12-20	Casein
Canase	25-30	15-17	The same
Alpha-chemotrypsin	200-230	15-20	"
Glucoamylase	210-290	12-18	Starch
Beta-galactosidase	250-350	30-40	Lactose

Successful testing of a number of these preparations has been done in bubble-type reactors [reaction apparatus] with 3 and 10 liter working volumes. It is intended to produce an experimental batch of a support in 1985.

12319

CSO: 1840/153

METHOD FOR OBTAINING L-THREONINE

Moscow MIKROBIOLOGICHESKAYA PROMYSHLENNOST: EKSPRESS-INFORMATSIYA in Russian  
No 9, Sep 85 p 14

[Abstract in Russian under the rubric "Amino Acids": "Prospekt" ["Prospectus"],  
Moscow VNESHTORGIZDAT, 1985]

[Text] The proposed method makes it possible to obtain L-threonine in an amount up to 55 g/liter in 40 hours of fermentation. The coefficient of conversion of the carbon source into L-threonine reaches 40 percent. A strain of *Escherichia coli*, containing a hybrid plasmid capable of amplification, is used as producent. The strain is nonpathogenic.

A substantial advantage of the strain is its ability to produce the amino acid L-threonine alone, which greatly simplifies the crystalline product extraction stage. The basic components of the nutrient media are: commercial sugar (or glucose), ammonium sulfate, potassium phosphate, magnesium sulfate, hydrolysate of yeasts, and penicillin. The process is carried out with a temperature of 35-37 degrees Celsius, continuous stirring, aeration, and fractional introduction of source carbon. For extracting the crystalline product, the obtained culture fluid is subjected to heating, and the biomass is separated by centrifuging. Upon processing the native solution on an ion-exchanging resin, purity of the product reaches 99 percent, and the yield 92 percent.

12319

CSO: 1840/153

UDC 577.112.387.4.087.22:582.282.195.23.083.134

OBTAINING TRYPTOPHAN FROM ANTHRANILIC ACID BY MEANS OF CANDIDA UTILIS-295  
YEASTS IMMOBILIZED IN MEMBRANE BIOREACTOR

Moscow MIKROBIOLOGICHESKAYA PROMYSHLENNOST: EKSPRESS-INFORMATSIYA in Russian  
No 9, Sep 85 pp 13-14

[Abstract in Russian by Ye.A. Andreyeva, under the rubric "Amino Acids," of report by N.S. Markvichev et al. in "Tezisy dokladov u Vsesoyuznogo simpoziuma po inzhenernoy enzimologii (Polucheniye i primeneniye biokatalizatorov v narodnom khozyaystve i meditsine)" ["Report Theses at the All-Union Symposium on Engineering Enzymology (Obtaining and Applying Biocatalysts in the National Economy and Medicine)"], Olayne NPO "Biolar" Vol 1, 1985 p 303]

[Text] A two-stage process for the biosynthesis of L-tryptophan from anthranilic acid by means of *C. utilis*-295 yeasts has been carried out at the Moscow Chemical Technology Institute imeni D.I. Mendeleyev. In the first stage, periodic [batch] culturing was done, with fractional introduction of nutrient medium components and anthranilic acid (for the purpose of the microorganisms' adaptation to the latter) and the production of large concentrations of cell mass. In the second stage, culturing (immobilization) was carried out in a membrane bioreactor, with constant introduction of a fresh nutrient medium containing anthranilic acid. Cell-free culture fluid was drained off simultaneously. The degree of anthranilic acid's conversion, at a passage rate of  $D\ 0.25-0.4\ h^{-1}$  and a concentration of 1 g/liter, constituted 75-80 percent of the theoretical yield.

12319

CSO: 1840/153



## USE OF CELLS IN SYNTHESIS OF BIOLOGICALLY ACTIVE SUBSTANCES

Moscow PRAVDA in Russian 26 Nov 85 p 3

FRANTSEN, O.

[Abstract] Biotechnology is expected to have a major impact on the economic and social development of the USSR in the next two decades or so, as explained at the conference on "Biotechnology and Drug Production" held at the All-Union Scientific Research Institute of Antibiotics. In addition to the production of antibiotics by the techniques of genetic engineering, the USSR has succeeded in the production of interferon by the same means, insulin, and many other hormones and drugs. A. Stepanov, director of the Scientific Research Institute for Biological Testing of Chemical Agents, reported on the recent improved synthesis of riboflavin by genetic engineering, which increased the efficiency of the process four- to five thousand-fold. Other advances include the use of fertilized mouse oocytes as factories for the enhanced synthesis of various biologically active substances.

[184-12172]

## HEMATOLOGISTS' CONGRESS REPORTS ON BIOTECHNOLOGY, BLOOD-SUBSTITUTE R&D

Moscow MEDITSINSKAYA GAZETA in Russian 15 Nov 85 p 3

[Abstract] A collection of articles reports results of the Second All-Union Congress of Hematologists and Transfusiologists, which took place in L'vov. Some of the principal reports and papers given at the congress are summarized. The election of a new board of the All-Union Scientific Society of Hematologists and Transfusiologists is announced. Oleg Konstantinovich Gavrilov, member of the USSR Academy of Medical Sciences, was re-elected chairman of the board. Gavrilov served as chairman of the congress.

One of the articles records an interview with Gavrilov regarding advances in biotechnology that are of interest to hematologists. He singled out hematologic engineering, which he said enables a physician to prepare extempore a transfusion medium at the patient's bedside, and to remove selected elements from the patient's blood or add them to it. He said that this technology is scheduled for introduction shortly at major republic and oblast hospitals.

Gavrilov also mentioned recent advances in genetic engineering, noting that it was used to obtain human interferon, insulin and growth hormone in 1984. Preparations which stimulate immunity are under development, and antithrombins and other blood proteins are being synthesized. Gavrilov commented in particular on a method for obtaining antibody-producing hybrid cells, or hybridomas, which has been developed in recent years. These cells are obtained by fusing a myeloma cell with a lymphocyte that is sensitized to a certain antigen and produces an antibody against it. From the myeloma cell, this hybridoma acquires the ability to divide indefinitely, while the lymphocyte causes it to produce only a single, or monoclonal antibody. The substrate obtained by this method is said to be free of impurities of other antibodies. The lymphocyte produces an unlimited amount of immunoglobulin with prescribed properties.

Another article summarizes the congress' discussion of work which is being done on problems of preserving blood and preserving and transplanting bone marrow, and on the study, development and introduction of new blood substitutes. Mention is made of a number of new preparations which have been developed in this connection. They include preparations with anti-shock action, such as "polyglukin" and "reopolyglukin"; polyfunctional blood substitutes with rheological, diuretic and hemodynamic effects, which are called "polifer" and "reoglyuman"; and a highly effective new blood substitute with detoxifying action, which is called "neogemodez". The first industrial lots of neogemodez reportedly have been sent to clinics.

FTD/SNAP/9835  
CSO: 1840/194

UDC 577.152.321\*4'135

#### APPLICATIONS OF DYED CELLULASE SUBSTRATES

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 11, No 10, Oct 85  
(manuscript received 15 Mar 85) pp 1330-1342

RABINOVICH, M. L., SAVITSKENE\*, R. Yu., GERASIMAS\*, V. B., MELNIK, M. S., NOVIKOVA, T. V., STEPONAVICHYUS\*, Yu. Yu., DENIS\*, G. Y. and KLESOV, A. A., Institute of Biochemistry imeni A. N. Bakh, USSR Academy of Sciences, Moscow; \*"Ferment" Scientific Research Association, Vil'nyus

[Abstract] Dyed cellulose substrates were analyzed for their utility in various studies on cellulases, using both soluble and insoluble (amorphous) substrates. Both the soluble CM-cellulose and the insoluble cellulose were treated with a naphthalene series vinyl-sulfone dye. The spectrophotometric studies demonstrated that the soluble preparation served as a selective substrate for endoglucanase in a variety of fungal cellulase complexes. The amorphous substrate was attacked by both endoglucanases (more efficiency) and cellobiohydrolases with the formation of colored products. Studies with the latter substrate also revealed enzyme translocation from substrate

molecule to substrate molecule. The use of the dyed substrates made possible direct spectrophotometric determination of adsorbed endoglucanase, rate of desorption, and analysis of substrate topography. Figures 8; references 12: 8 Russian, 4 Western.  
[172-12172]

UDC 577.152.321\*91'1

#### SPECIFIC ADSORPTION OF TRICHODERMA REESEI CELLOBIOHYDROLASE I ON CELLULOSE PRODUCTS

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 11, No 10, Oct 85  
(manuscript received 6 Mar 85; in final form 12 Apr 85) pp 1343-1347

RABINOVICH, M. L., NOVIKOVA, T. V., KLESOV, A. A. and BEREZIN, I. V.,  
Institute of Biochemistry imeni A. N. Bakh, USSR Academy of Sciences,  
Moscow

[Abstract] A combination of affinity chromatography and isoelectric focusing was employed to resolve cellulolytic enzymes in cellulase complex isolated from *Trichoderma reesei* culture fluid. Initial step consisted of adsorption of the enzymes to cellophane or viscose, followed by quantitative electrofocusing. The major enzymatic components showing firm binding to the microcrystalline cellulose preparations were cellobiohydrolase I (pI 4.2), its 2-3 isozymes (pI 3.8-4.0), and endoglucanase I (pI 4.7) and its isozymes (pI 4.3-4.8). The preferential binding of cellobiohydrolase I to cellophane and viscose has also provided a method for its rapid identification and isolation from various crude enzyme preparations. Figures 1; references 12: 2 Russian, 10 Western.  
[172-12172]

#### BIOSYNTHESIS OF GINSENG

Minsk IZOBRETATEL I RATSIONALIZATOR in Russian No 10, Oct 85 pp 14-15

ELSHANSKIY, B.

[Abstract] Ginseng biomass grown in a special culture medium is used in a newly developed tonic "Panaks" along with kvass and pine needle extract. The ginseng infusion has also been used in a popular skin cream. The same approach of growing cell cultures in a liquid nutrient medium could be adapted to producing other plant cells, such as lily of the valley or heliotrope, reducing the need to import some essential oils. A new production line for ginseng will give 10 to 20 tons a year of the infusion, but demand is growing rapidly and may soon include the medical industry--clinical tests of new stimulating medicines based on ginseng are now in progress.  
[133-12672]

## ENVIRONMENT

### NITRATE FERTILIZERS AND NITRATE TOXICITY

Frunze SOVETSKAYA KIRGIZIYA in Russian 18 Sep 85 p 4

[Abstract] The September 1, 1985 issue of SOVETSKAYA KIRGIZIYA called attention to cases of nitrate toxicity among consumers of locally produced fruit crops as a result of excessive use of ammonium nitrate fertilizers. In response, a special commission was created by the Presidium of the Council of Ministers of the Kirghiz SSR to look into the matter, discipline those responsible, and monitor the situation. A discussion with L. I. Luskin, Kirghiz SSR Minister of the Fruit Industry, and B. M. Shapiro, Deputy Minister of Health of the Kirghiz SSR, has shown that effective measures have been taken to prevent similar occurrences in the future. It is to be noted, however, that, to date, no individuals have been subjected to any disciplinary actions, and that only monetary fines have been imposed. This may explain the fact that even today some administrators of collective farms still try to pass off substandard fruits on the consumers.  
[178-12172]

UDC 613.632-07

### HYGIENIC EVALUATION OF INDUSTRIAL CHEMICAL PLANT COMPLEX

Moscow GIGIYENA TRUDA I PROFESSIONALNYYE ZABOLEVANIYA in Russian No 8, Aug 85 (manuscript received 17 Dec 84) pp 5-9

MIKHAYLUTS, A. P., ZENKOV, V. A., DAVYDOVA, N. N., KRASNOV, A. S., ANASTASOVA, Ye. G., KUZMINSKAYA, L. M. and DROZDOVA, O. M., Medical Institute, Oblast Sanitary Epidemiology Station, Kemerovo

[Abstract] Industrial-hygiene evaluations of industrial complexes containing chemical plants are particularly important in Siberia, where metrological conditions unfavorable for exhaust dispersion are frequent. In this regard, the air quality of an industrial complex containing three chemical firms, a coke byproduct plant, a thermal power plant and construction industry factories was evaluated. Data was taken at 22 locations, for a total of 1510 air samples. The chemical factories were found to emit ammonia, sulfuric acid aerosol, nitrogen oxides, sulfur dioxide, hydrogen sulfide, carbon

monoxide, phenol and amines. Up to 36% of the emissions came from ventilation exhaust, open equipment and incidental production exhaust. Carbon monoxide, ammonia, phenol, cyclohexane and hydrogen sulfide were mainly released from these sources and their concentration in the air of the industrial complex was proportional to the amount of emission. The concentration of harmful substances in the air was substantially elevated by unfavorable weather conditions; under these conditions, levels of 0.9-2.8 times the maximum permissible concentration were measured. The chemical plants affected the air quality in the complex for a distance of 2.5-3 km. Emissions of water vapor and aerosols also lowered air humidity. These observations should be taken into account when planning the construction of chemical plants in industrial complexes. In existing factories, measures should be taken to limit emissions. References 5 (Russian).  
[067-12126]

/9835



UDC 619:616.988.43:636

WILD ARTIODACTYLS AS RESERVOIRS OF FOOT-AND-MOUTH DISEASE VIRUS

Moscow VETERINARIYA in Russian No 8, Aug 85 pp 37-38

KRUGLIKOV, B. A., MELNIK, R. I. and NALIVAYKO\*, V. G., All-Union GNKI [expansion unknown] of Veterinary Preparations; \*Main Administration of Veterinary Medicine, USSR Ministry of Agriculture

[Abstract] A minireview is presented of the potential role of wild artiodactyls as reservoirs of foot-and-mouth disease virus, with particular reference to cases that may apply in the USSR. In view of the virtual liquidation of this disease in the USSR, isolated cases require careful consideration of the role that the large artiodactyl population may play. To that end, measures have been instituted to collect blood samples from such wild animals, and recommendations have been provided for carrying out standard serologies. In addition, tests are also carried out on suckling mice or in tissue cultures to determine the presence of neutralizing antibodies, and special alert bulletins are issued by local veterinary services and the Main Administration of Veterinary Medicine of the USSR Ministry of Agriculture.

[159-12172]

UDC: 616.9-022:38:579.842.1/.2]-078

STUDY OF BIOCHEMICAL PROPERTIES OF ENTEROBACTERIA ON POLYSTYRENE PLATES

Moscow VOPROSY PITANIYA in Russian No 5, Sep-Oct 85  
(manuscript received 21 Nov 84) pp 51-54

KUVAYEVA, I. B., KUZNETSOVA, G. G., SAKIMBAYEVA, S. D. and GRIGORYEVA, A. N., Institute of Nutrition, USSR Academy of Medical Sciences, Moscow

[Abstract] A number of systems have been developed abroad for identification of enterobacteria, including API 20E, Enter-Set20, PathoTec Rapid 1-D, Enterolube, Corning r/b, Mini-tek and Micro-ID. Introduction of the new diagnostic preparations SIB and UBD developed at the Cor'kiy Scientific

Research Institute of Epidemiology and Microbiology and the Kishinev Medical Institute significantly facilitates and reduces the time of analysis. The purpose of this article was to check the reliability of biochemical testing of enterobacteria on polystyrene plates using the usual nutrient media. The data obtained agreed with traditional test data for most of the 84 strains tested. The micromethod using polystyrene plates does not differ basically from the classical method except for the altered ratio of reagents used in the study of the biochemical properties of enterobacteria, allowing reliable results to be obtained very rapidly. The method is simple, easy and economical, being 15 to 30 times faster and using 10 to 20 times less reagents and nutrient media. The micromethod of studying biochemical properties on polystyrene plates is recommended for broad application. References 8: 3 Russian, 5 Western.

[076-6508]

/9835

PREPARATION OF PROTEINASES FROM MICROMYCETE

Moscow MIKROBIOLOGICHESKAYA PROMYSHLENNOST: EKSPRESS-INFORMATSIYA in Russian  
No 9, Sep 85 pp 12-13

[Abstract in Russian by N.B. Zotova, under the rubric "Enzymes," of "Prospekt Voronezhskogo tekhnologicheskogo instituta" ["Prospectus of Voronezh Technological Institute"], Voronezh Kommuna, 1985 four pages]

[Text] A micromycete which effectively synthesizes proteinases having high activity and stability in the acidic pH zone (2.5-5.5), thermally stable and able to hydrolyze protein extensively (degree of hydrolysis--47-73 percent), and bringing about active coagulation of milk casein, has been produced in the Voronezh Technological Institute's Department of Microbiology and Biochemistry.

The preparation, called "pigmauyesin," is obtained by biosynthesis on specific nutrient media in surface or deep culturing. A combined preparation of proteinases and preparations of electrophoretically homogeneous fractions is extracted by precipitation and fractionation with ammonium sulfate (the stage of obtaining "pigmauyesin P10Kh" and "pigmauyesin G20Kh"), then the enzymes are purified by thermal processing at low pH values in the presence of calcium ions; desalination and fractionation are carried out on sefadexes [sefadeksy--not further identified]; and concentration is done by processing with acetone. The technology for obtaining the preparations has been introduced at Glavmikrobioprom [Main Administration of the Microbiological Industry] enterprises.

Laboratory tests and industry approval have shown the economic advisability and effectiveness of using the preparation in the technology and original recipes-creation of processed cheeses, in bread baking, and in producing various hydrolysates--food and feed products enrichers. The preparation of proteinases is being used at dairy industry enterprises in the technology of producing highly purified lactose.

The total economic impact of using processes based on the preparation in various branches of industry amounts to 50,000 rubles for enterprises of average capacity.

More detailed information may be obtained from the Voronezh Technological Institute (VTI) at the address: 394017, g. Voronezh, pr. Revolyutsii, 19 [19 Revolution Prospect, Voronezh 394017].

UDC: 613.381:613.294

BIOLOGICAL VALUE OF SAUSAGE PROTEINS CONTAINING COMBINED BLOOD-BASED PROTEIN PREPARATION

Moscow VOPROSY PITANIYA in Russian No 5, Sep-Oct 85  
(manuscript received 13 Nov 84) pp 23-26

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[Abstract] The blood from slaughtered animals is valuable as a raw material for the production of various food products and intermediates. Blood can be used in the production of combined products such as tasty, easily digestible sausages. The authors have suggested a new physical method of decoloration of blood to allow its use in such products, allowing the quantity of blood to be increased by a factor of 2.5 to 3, decreasing the fat content by a factor of 5 in comparison to previously used methods. Several recipes are developed for combinations of blood protein, milk and egg products theoretically capable of replacing veal and pork proteins in sausage products in any quantity without any reduction in essential amino acid content. Replacement of over 50% of meat with the mixture, however, resulted in some decrease in food value in practical experiments.

References 10: 7 Russian, 3 Western.

[076-6508]

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GENETIC CONTROL AND LOCALIZATION OF THREE GENETIC FACTORS IN BARLEY  
CHROMOSOMES 1 AND 5

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 284, No 3, Sep 85  
(manuscript received 2 Apr 85) pp 740-745

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Selection Genetics Institute, Odessa; Institute of General Genetics  
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[Abstract] In order to identify chromosomal markers for genotype selection, the coupling of the  $Ml-a_{ma}$ ,  $sex6$ ,  $Pgd3$  and  $Prx1$  loci and reciprocal translocation of  $TI-?$  with  $Nn$ ,  $Hrd A$ ,  $Hrd B$ ,  $Pgd 2$  and  $r$  genes were studied in barley. In these studies, the MK 6827 mutant, which was isolated in Odessa in 1981, was crossed with *Nigrinudum* and *Bonus* ( $TI-5a$ ) strains, while the Southern strain was crossed with *Magnif 105*. Analysis of  $F_2$  and  $F_3$  hybrids from Southern x *Magnif 105* demonstrated that the resistance to powdery mildew in *Magnif 105* is connected with one dominant factor,  $Ml-a_{ma}$ , located on the short arm of chromosome 5 between the  $Hrd A$  and  $Hrd B$  loci. Translocational analysis indicated that the allele of the  $sex 6$  mutation in MK 6827 is located on chromosome 1. Results of the  $F_2$  MK 6827 x *Nigrinudum* cross led to the conclusion that the  $Sex 6$  allele is on the long arm of chromosome 1, 13.3% closer to the centromer than the  $Nn$  allele. These results also showed that the long arm of chromosome 1 is not critical for the genetic control of phosphogluconate dehydrogenase 3 synthesis and that  $Pgd 3$  does not couple with  $TI-?$  ( $Nig.$ ). From electrophoretic data on  $F_2$  seeds of the Southern x *Magnif* cross it could be concluded that cathodic peroxidase has a monomeric structure in barley and that the enzyme difference between the two crossed strains are connected with one, codominant-type allele, designated  $Prx 1$ . This locus was found not to be situated on chromosome 5. By analogy with wheat chromosomes,  $Prx 1$  is probably located on chromosome 4 and/or 7. Figures 2; references 15: 2 Russian, 13 Western. [063-12126]

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UDC 615.2:578.245.015.21.4

EFFECT OF NATURAL AND RECOMBINANT INTERFERONS ON DEVELOPMENT OF ANTIVIRAL  
STATE AND ACTIVITY OF NATURAL KILLER CELLS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 254, No 6, Oct 85  
(manuscript received 22 Nov 84) pp 1514-1516

KUZNETSOV, V. P., AVDEYEV, G. I., VYADRO, M. M., LEYKIN, Yu. D. and  
FROLOVA, I. S., Scientific Research Institute of Epidemiology and Micro-  
biology imeni N. F. Gamaleya, USSR Academy of Medical Sciences, Moscow;  
Moscow Scientific Oncological Research Institute imeni P. A. Gertsen

[Abstract] In an attempt to evaluate therapeutic potential of the recombinant  $\alpha$ -component of human leucocyte interferon (rL), its ability to cause development of an antiviral state in a diploid culture of human embryonic fibroblast was studied along with the ability to activate cytotoxic activity of natural killer cells towards the tumor cells. Development of the antiviral state is one of the first protective reactions of all cells against viral infections. A rapid and intensive development of the antiviral state indicated high prophylactic potential of rL against viral diseases. Further work showed that both rL and the natural preparation of human leucocyte interferon caused activation of natural killer cells to about the same degree. Overall, no significant differences were observed in the natural and recombinant interferons. Figures 2; references 6: 2 Russian, 4 Western.  
[179-7813]

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## LASER EFFECTS

UDC 617.7-007.681-085.849.19-036.8-07

### COMPARATIVE EVALUATION OF LASER TREATMENT EFFECTIVENESS OF COMMON AND PSEUDOEXFOLIATIVE PRIMARY OPEN-ANGLE GLAUCOMA

Moscow VESTNIK OFTALMOLOGII in Russian Vol 101, No 3, May-Jun 85  
(manuscript received 23 Dec 84) pp 9-12

MAMEDOV, N. G., candidate of medical sciences, SHTILLERMAN, A. G., aspirant and FROLOV, A. V., Problem Scientific Research Laboratory of Eye Microsurgery, Chair of Eye Diseases, Second Moscow Medical Institute imeni N. I. Pirogov (Director, Prof. A. P. Nesterov, corresponding member of USSR Academy of Sciences)

[Abstract] The goal of this work was to compare results of laser treatment of common and pseudoexfoliative open-angle glaucoma. In all 268 patients, aged 56-83 years, were evaluated (322 individual eyes were treated). All patients treated exhibited reactive syndrome manifestations: transitory hypertension, irritation, hypersecretion. Overall, the laser treatment was somewhat more effective in common glaucoma cases as manifested by greater hypotensive effect and better preservation of vision sharpness after long follow up, regardless of the stage of the disease at the time of therapy. References 5: 3 Russian, 2 Western (1 by Russian author). [1003-7813]

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## MARINE MAMMALS

### INFECTIOUS DISEASES OF MARINE MAMMALS: FOREIGN LITERATURE SURVEY

Moscow VETERINARIYA in Russian No 9, Sep 85, pp 73-75

KOZLOVA, D. I. and BESKHLEBNOV, V. A.

[Abstract] A survey is presented of largely American literature dealing with viral and bacterial infections in various marine mammals. Primary attention is accorded to well-documented cases in dolphins, whales, sea lions and seals, with the notation that large-scale epidemiologic surveys were started in the US in 1972. Mention is also made of parasitic infections in pinnipeds, and the fact that there have been cases of investigators in the US being infected with leptospiras from infected marine mammals.

[161-12172]

UDC 534.75:612.85

### EFFECT OF AIR IN EXTERNAL AUDITORY MEATUS OF TRUE SEALS ON AUDITORY SENSITIVITY DURING SUBMERSION

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 285, No 2, Nov 85  
(manuscript received 12 Apr 85) pp 500-502

LIPATOV, N. V., Institute of Evolutionary Animal Morphology and Ecology  
imeni A. N. Severtsov, USSR Academy of Sciences, Moscow

[Abstract] Baikal seal pups (*Pusa sibirica*) and an adult Caspian seal (*P. caspica*) were used to assess the effects of air captured in the external auditory meatus during submersion on auditory sensitivity. Analysis was conducted in terms of the magnitude of the cochlear microphonic potential in response to a tonal signal. The results demonstrated that diminution of the air content in the external auditory meatus during submersion had an adverse effect on auditory sensitivity, and that the effect was reversible with reintroduction of air. Air captured in the external auditory meatus thus functions as one of the conducting elements in the true seal, with a change in air volume or its contact with surrounding tissues affecting auditory sensitivity. Auditory sensitivity in the true seals is basically determined by tympanal and not bony conductivity. References 5: 2 Russian, 3 Western.

[169-12172]

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3 min on each side. After two treatments, the sound spectra of the lungs of patients with bronchial asthma coincided with those of healthy patients. Because of its accuracy and simplicity, this method could find wide application in clinical practice. Figures 3; references 1 (Russian).  
[132-12672]

#### USE OF ORGANIC PERFLUORINE COMPOUNDS AS BLOOD SUBSTITUTES

Riga SOVETSKAYA LATVIYA in Russian 12 Nov 85 p 4

[Abstract] The article reports on the development, introduction and advantages of blood substitutes based on organic perfluorine compounds.

It is recalled that search for blood substitutes capable of performing the gas-exchange function of natural hemoglobin began in the USSR in 1972. Original experiments with dogs were performed successfully in 1979 at the USSR Academy of Sciences' Institute of Biological Physics, which is headed by Genrikh Ivanitskiy. Up to 70 percent of the animals' blood by weight was replaced with an organic perfluorine preparation in these experiments. This led to the development of the first synthetic blood substitute of a new type, which is called "perftoran". Perftoran supplied by a laboratory of the institute was first used experimentally in the treatment of a human patient in 1982. This laboratory was headed by Professor Feliks Beloyartsev.

Since the end of 1984, perftoran reportedly has been used in more than 600 operations performed on human patients at leading medical institutions. Professor Arnold Kaydash of the USSR Academy of Medical Sciences' Institute of Surgery imeni Vishnevskiy has performed more than 150 heart operations using an organic perfluorine emulsion enriched with oxygen, and a special unit for circulating blood substitutes. Other preparations of this type are said to be now in the testing stage, including ones called "perfuzol", "ftorem" and "perfukol".

Perfluorocarbon emulsions that carry oxygen reportedly are being used to preserve human kidneys and other vital organs intended for transplantation. Initial experience with the use of perftoran in kidney transplants indicates that it possesses a number of valuable properties, according to Valeriy Shumakov, corresponding member of the USSR Academy of Medical Sciences and director of the Scientific Research Institute of Transplantology and Artificial Organs. More than 30 transplants of kidneys preserved with it have been performed at this institute.

FTD/SNAP/9835  
CSO: 1840/194

182 patients show the positive effects, going beyond "vascular exercises" that were once considered the chief benefit of such treatment. Good results were obtained with various disease and traumatic eye problems, including contusions, non-perforating trauma, burns, purulent corneal ulcers, herpetic keratitis, iridocyclitis and uveitis. Transcapillary exchange and oxygen flow were improved. The procedure can be performed readily in polyclinics on an out-patient basis. Figures 1; references 15: 9 Russian, 6 Western. [129-12131]

#### BENEFICIAL EFFECTS OF LIMITED OXYGEN INTAKE

Minsk IZOBRETATEL I RATSIONALIZATOR in Russian No 10, Oct 85 pp 10-11

KATIN, S.

[Abstract] Restriction of oxygen intake has some therapeutic value. Radiation doses have a significantly less debilitating effect when the patient is simultaneously in a state of hypoxia. In radiation treatment of cancers, breathing a 10-90 oxygen-nitrogen mixture gives optimum protection to the patient. Hypoxia can also provide the healing or sports conditioning benefits of high altitudes without the need to adapt to low atmospheric pressures, low temperatures, and high levels of solar radiation. These benefits could be made available to the general public by the use of a simple apparatus consisting of a face mask, a breathing sack with a caustic soda absorbent for carbon dioxide, and an air intake restricting the inflow of fresh air to maintain a low oxygen level in the breathing sack. A cooling vessel using plastic spheres with ordinary salt solution chilled in a refrigerator could reduce the heat and moisture content of the recycled air, making the use of the apparatus more comfortable. [133-12672]

#### ADVANCES IN INTERVENTIONAL RADIOLOGY

Moscow IZVESTIYA in Russian 9 Nov 85 p 8

IVCHENKO, L.

[Abstract] Computerized tomography has been carried beyond strictly diagnostic use, and has been expanded into a therapeutic modality. F. Todua, director of the Computerized Tomography Laboratory at the Institute of Surgery imeni A. V. Vishnevskiy, explained how tomography is now used not only to localize lesions, but also in the treatment of various conditions. Examples cited included location of cysts and abscesses in the liver and pancreas, their catheterization and drainage. M. Kuzin, director of the Institute, expressed the willingness of the staff to share their clinical expertise in interventional radiology with other institutions, but pointed out that there are very few centers in the USSR that are equipped with computerized tomographic



EFFECT OF TEMPERATURE ON GROWTH AND METABOLISM OF METHYLOMONAS METHANICA

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 284, No 3, Sep 85  
(manuscript received 29 Apr 85) pp 746-748

GAYAZOV, R. R., SHISHKINA, V. N., MSHENSKIY, Yu. N., TROTSENKO, Yu. A. and  
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[Abstract] Gas metabolism and levels of various enzymes of methane metabolism were studied in *Methylomona methanica* strain 12 cultivated at temperatures between 30°C and 37°C. The greatest specific growth rate was seen at 37°. The activities of hexulose-phosphate synthetase and phosphoenolpyruvate carboxylase were greater at 37° than at 30° while those of formaldehyde and formate dehydrogenases were lower. NAD-dependent methanol and formate dehydrogenase levels were maximal at 32°-34°. This indicates that the activity of assimilation enzymes increased with temperature while that of oxidative enzymes decreased. Maximum methane and oxygen production was observed at 35°-36°. Carbon dioxide production decreased with increasing temperature. As the temperature is increased the methane carbon is probably redistributed at the formaldehyde level to enhance constructive metabolism, as a result of changes in the ratio of the activities of the enzymes involved. References 10: 5 Russian, 5 Western.  
[063-12126]

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STUDY OF CHLORAMPHENICOL ACETYLTRANSFERASE GENE EXPRESSION EFFECTIVENESS  
UNDER CONTROL OF FOREIGN REGULATORY REGIONS IN ESCHERICHIA COLI CELLS.  
PART I. VECTOR CONSTRUCTION FOR CLONING OF REGULATORY TRANSCRIPTION  
ELEMENTS

Moscow MOLEKULYARNAYA BIOLOGIYA in Russian Vol 19, No 5, Sep-Oct 85  
(manuscript received 21 May 84) pp 1194-1205

MASHKO, S. V., LEBEDEVA, M. I., PODKOVYROV, S. M., KASHLEV, M. V.,  
TRUKHAN, M. E., REBENTISH, B. A., KOZLOV, Yu. I. and DEBABOV, V. G.,  
All Union Scientific Research Institute of Genetics and Selection of  
Industrial Microorganisms, Moscow

[Abstract] To assure expression of cloned DNA fragments in a new host cell, "hybrid genes" must be constructed capable of assuring initiation of transcription and translation in the recipient cell. Systematic data on various stages of expression assuring high protein yield are not available. An attempt was made to use promoters for highly effective transcription and to study the role of nontranslating fragments of mRNA in the initiation of translation. Two plasmids pML 2.1 and pML 4 were constructed for cloning regulatory transcription elements and their restriction maps were established along with complete sequence. The structural part of chloramphenicol acetyltransferase gene of the pBR 325 in pML 2.1 plasmid is under control of the regulatory region of lactase operon. Presence of unique restrictase cleavage elements B<sup>am</sup> HI in the joint region makes it possible to selectively clone transcription termination regions selecting for clones with the Ap<sup>r</sup>Cm<sup>s</sup> phenotype. In the pML 4 plasmid effective expression of the cat gene can be achieved only by cloning promoter regions. These plasmids are useful building blocks for various genetic engineering experiments because of their small size, presence of one or two genes resistant to antibiotics (Ap<sup>r</sup> or ap<sup>r</sup>Cm<sup>r</sup> respectively) and useful location of unique cleavage sites by restriction nucleases. Figures 5; references 36: 6 Russian, 30 Western. [128-7813]

the basis of antibody inhibition studies, and both the yeast and bacterial enzymes yielded identical hydrolytic products. In addition, the  $\alpha$ -amylases produced in bacteria and yeast showed identical mobilities in polyacrylamide gel electrophoresis. The yeast system also produced minor ' $\alpha$ -amylase' components which probably represented incomplete or improper processing of the bacterial gene product in the yeast system, all of which were also secreted. Figures 3; references 14: 2 Russian, 12 Western.  
[169-12172]

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UDC 616.24-002.2-085.849.11-036

EFFECT OF DECIMETER RANGE WAVES IN COMBINATION WITH DRUG ELECTROAEROSOLS  
ON IMMUNOINFLAMMATORY PROCESSES DURING CHRONIC NONSPECIFIC LUNG DISEASES

Moscow VOPROSY KURORTOLOGII, FIZIOTERAPII I LECHEBNOY FIZICHESKOY KULTURY  
in Russian No 5, Sep-Oct 85 (manuscript received 22 Mar 85) pp 13-16

AYRAPETOVA, N. S. and TKACHENKO, A. F., Central Scientific Research  
Institute of Health Resort Science and Physiotherapy, Moscow

[Abstract] An attempt was made to optimize the therapy of chronic nonspecific pulmonary diseases using a combination of decimeter range waves (DRW) and broncholytic electroaerosols. The electroaerosols penetrate rapidly deep into the lungs up to the aveoli, combining the action of an electric charge with the pharmaceutical effect. In all, 232 patients were studied (94.8% with chronic bronchitis, 5.2% with chronic pneumonia) manifesting an active inflammatory process, disturbance of the immune status and diminished glucocorticoid activity. After 15 procedures of combined therapy, 88.5% of the patients showed improvement in their clinical status; 65.4% of the control group (receiving only the electroaerosol) also showed improvement. In this combined therapy, the antiinflammatory and immunosuppressive effect were achieved due to the action of DRW; the electroaerosols had a positive effect on the functional state of the cardiorespiratory system.

References 11: 8 Russian, 3 Western.

[1001-7813]

STATE OF IMMUNE SYSTEM OF PATIENTS WITH INFECTIOUS-ALLERGIC ASTHMA SUBJECTED TO TRANSCEREBRAL EXPOSURE TO UHF ELECTRON FIELD (27, 12 MHz)

Moscow VOPROSY KURORTOLOGII, FIZIOTERAPII I LECHEBNOY FIZICHESKOY KULTURY  
in Russian No 5, Sep-Oct 85 (manuscript received 12 May 85) pp 10-13

BOGOLYUBOV, V. M., MALYAVIN, A. G., PERSHIN, S. B., SHUBINA, A. V., KUBLI, S. Kh.  
and MYSHELOVA, K. P., Central Scientific Research Institute of Health Resort  
Science and Physiotherapy, Moscow

[Abstract] An attempt was made to affect immunologic reactions in infectious-allergic asthma patients (IAA) by subjecting them to transcerebral exposure to UHF electric field. Seventy six patients, aged 23 to 69 years with varying duration of the disease, were studied. The treatment consisted of 25 exposures lasting from 5 to 15 min; a sham exposure was used on ten patients serving as controls. In all, 55/66 patients experienced clinical improvement lasting 6 to 12 months; only 2/10 control patients had any improvement. After the exposure, the level of T-lymphocytes increased along with blood histamine level; no significant changes were observed in case of B-lymphocytes. This immunologic correction was most effective in patients with atopy, with decreased levels of T-lymphocytes and elevated levels of B-lymphocytes. References 12: 9 Russian, 3 Western.

[1001-7813]

THERAPEUTIC EFFICIENCY OF DECIMETER RANGE WAVES AND THEIR EFFECT ON CEREBRAL CIRCULATION IN PATIENTS DURING RECOVERY PERIOD AFTER SURGERY PERFORMED ON INTRACRANIAL ARTERIES

Moscow VOPROSY KURORTOLOGII, FIZIOTERAPII I LECHEBNOY FIZICHESKOY KULTURY  
in Russian No 5, Sep-Oct 85 (manuscript received 14 Mar 85) pp 33-36

DANILOVA, D. P., STRELKOVA, N. I. and STRELTSOVA, Ye. N., Central c  
Scientific Research Institute of Health Resort Science and Physiotherapy,  
Moscow

[Abstract] The goal of this work was to evaluate the therapeutic effect of an electromagnetic field in the decimeter range (DRW) on focal neurologic symptoms and cerebral circulation in patients recovering from surgery on intracranial arteries. This treatment led to regression of focal neurologic symptoms and improved cerebral circulation in 86.3% of patients who tolerated this procedure rather well. This approach was recommended as a method of choice for rehabilitative treatment during the postsurgical period. Figures 1; references 7: 6 Russian, 1 Western.

[1001-7813]

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EFFECT OF FUSARIOTOXIN T-2 ON YOUNG PIGS

Moscow VETERINARIYA in Russian No 8, Aug 85

[Article by V. V. Rukhlyada, the Ukrainian Scientific Research Institute of Experimental Veterinary Medicine]

[Text] Toxicogenic fusaria of a section of *Sporotrichiella* produce several toxic metabolites of the epoxytrichothecene T-2 groups, HT-2 toxins, neosolaniol and diacetyoxycipenol (Y. Ueno, et al., 1972; C. Szathmari, et al., 1976; V. V. Yermakov, et al., 1978). Of these, T-2 toxin is produced in a significant amount and is the most toxic (Y. Ueno, et al., 1973; B. Yagen, et al., 1977).

Therefore we decided to determine the sensitivity of young pigs to purified T-2 toxin and reproduce acute and subacute toxicosis.

T-2 toxin was obtained from a culture of fungus *F. sporotrichiella* extracted from feed which had caused fusariotoxicosis in animals. In cultivating it on a mixture of grains (barley and corn in equal parts), the fungus produced 1 g/kg of T-2 toxin, HT-2 toxin and neosolainol, and on rice it produced from 2.33 to 3.06 g/kg. The T-2 toxin was extracted with a chloroform-acetone mixture (85:15) threefold and purified by means of column adsorption chromatography (A. N. Kotik and coauthor, 1979).

Undertaking experiments to study the sensitivity of pigs to T-2 toxin and to reproduce acute and subacute toxicosis, we proceeded from data from the literature (E. B. Smalley, 1973), in accordance with which, 4 mg/kg of LD<sub>50</sub> T-2 toxin, obtained from a culture of fungus *F. tricinctum*, is used when administered perorally. We tested doses of toxin in the amounts of 1.5; 2; 3 and 4 mg/kg on 11 young pigs with a live weight of 10 to 16 kg.

The research showed that one-time doses of toxin in the amounts of 2, 3 and 4 mg/kg of body weight caused T-2 toxicosis in the young pigs, the severity of the course of which was directly dependent on the administered dose. A 2 mg/kg dose of toxin caused a clinical manifestation of toxicosis characterized by depression and loss of appetite. The animal becomes listless, spends most of the time lying down and vomiting is observed. These symptoms disappear in 48 hours. The 3 mg/kg dose (2 young pigs) causes acute toxicosis with an analogous clinical picture. Most of the animals display weakness, they get

up reluctantly and with difficulty, their gait is unsteady, the pulse quickens and is arrhythmic, and the heartbeat intensifies. The young pigs lose weight and their growth becomes stunted.

The 4 mg/kg dose (3 young pigs) also caused acute toxicosis which was lethal in two of the animals. The third pig, which received this dose twice one day apart, lived due to the fact that vomiting was observed after the toxin was administered. Apparently, the majority of the toxin was removed from the its stomach with the vomited matter.

Changes in the morphological and biochemical composition of the blood (table 1) were characterized by an increase in the amount of erythrocytes, by neutrophilic leukocytosis with displacement of the nucleus to the left and by eosino- and lymphocytopenia.

The total protein content of the blood serum decreased (hypoproteinemia), the albumin content decreased and the alpha and beta globulin content increased. The calcium content decreased.

In two young pigs which suffered from acute T-2 toxicosis (3 mg/kg dose) the amount of leukocytes decreased on the third and sixth days of the experiment.

As a result of illness, in the first week after the toxin was administered a decrease in the live weight gain increment was observed and, after two weeks, the weight gain increment in the experimental subjects was 30-31.8% higher than the control group.

In three young pigs with an initial average weight of 13.6 kg subacute toxicosis was reproduced by means of administering a daily 1.5 mg/kg dose of T-2 toxin. Three other young pigs (with an average weight of 14 kg), which did not receive any toxin, served as a control.

In the test pigs, the general condition was a certain amount of depression, the appetite progressively deteriorated, from the fifth day an increase in the mucus content of the feces appeared, and in one pig vomiting was observed. The animals gradually became thinner, their growth and development became stunted, they became less mobile, their bristles lost their shine, two young pigs died on the 7th and 17th days of the experiment, having received 6 and 16 doses of toxin respectively. Two days before they died had diarrhea, the feces were of liquid consistency, straw-colored and mixed with mucus; the pulse quickened and the heartbeat intensified. General weakness developed sensitivity to pain and touch decreased and the gait became unsteady. After receiving 18 doses of T-2 the third young pig was found in a state of exhaustion, and from the 20th day after the beginning of the experiment it was not given any toxin. It was kept alive to investigate the changes in its blood during recuperation and to determine its economic value.

Before the beginning of the experiment the average daily increment for both the test and control animals was identical (table 2), for the first two

weeks a decrease in the increment of live weight in the test animals was observed in comparison with the control group, and by the end of the experiment they had lost weight. The variation in the live weight of the test pigs at the end of the experiment was 3.7 kg, whereas at the beginning it was only 0.4 kg.

By the 13-15th day of the experiment there was a decrease in the hemoglobin content of the blood from  $11.6 \pm 0.11$  g% to 9.0-9.8 g% and in erythrocytes from  $6.6 \pm 0.3$  mil/mm<sup>3</sup> to 5.4 mil/mm<sup>3</sup>. There was also a progressive development of leukopenia (amount of leukocytes 4.1-4.4 thou/mm<sup>3</sup> versus  $23.5 \pm 1.0$  thou/mm<sup>3</sup> before the beginning of the experiment). Before its death, there was an increase in leukocytes in one young pig from 4.1 to 7.8 thou/mm<sup>3</sup>. In the leukocyte formula a marked neutrophilia took place with displacement of the nucleus to the left. In this way the amount of immature neutrophils increased from 1% to 4-7%, and of those with bacillary nuclei from  $6 \pm 1.1\%$  to 26-43%. Lymphocytopenia was also detected (from  $52 \pm 4.3\%$  to 10-25%) as well as a decrease in the amount of eosinophils. Along with changes in the quantitative components of the blood, qualitative ones were also observed. In peripheral blood predominantly small lymphocytes and hypersegmentation with pyknosis of the nuclei were encountered in the neutrophils. Along with immature forms of neutrophils, immature erythrocytes were also detected in the form of polychromatophilic and orthochromic normoblasts.

Table 1

Morphology and Biochemistry of Blood in Young Pigs Receiving a 4 mg/kg to Weight Dose of T-2 Toxin

Indices	Before Administration of Toxin	24 Hours After Administration	Increase
Hemoglobin, g%	$11.2 \pm 0.3$	$11.5 \pm 0.6$	
Erythrocytes, mil	$6 \pm 0.2$	$7 \pm 0.4$	<0.05
Leukocytes, thou	$19.3 \pm 0.6$	$28.5 \pm 3.6$	<0.02
Thrombocytes, thou	$217.3 \pm 20.6$	$212 \pm 15$	
Basophils, %	$0.2 \pm 0.1$	--	
Eosinophils, %	$6 \pm 0.7$	$7.5 \pm 0.54$	<0.001
Neutrophils:			
immature, %	$0.4 \pm 0.2$	$13 \pm 2.6$	<0.001
bacillary nucleus, %	$4 \pm 0.5$	$35 \pm 4.1$	<0.001
segmental nucleus, %	$34 \pm 1.3$	$26 \pm 2.6$	<0.02
Monocytes, %	$3 \pm 0.5$	$1.7 \pm 0.8$	
Lymphocytes, %	$52 \pm 3.7$	$24 \pm 4.1$	<0.001
Total Protein of the Mucous Membrane, mg %	$6.21 \pm 0.12$	$5.85 \pm 0.32$	<0.1
Protein Fractions:			
albumin, %	$42.6 \pm 0.6$	$37.6 \pm 0.7$	<0.001
alpha globulin, %	$22 \pm 0.6$	$25.9 \pm 0.8$	<0.001
beta globulin, %	$16.4 \pm 0.8$	$18.4 \pm 0.1$	<0.01
gamma globulin, %	$19.1 \pm 0.4$	$18.2 \pm 0.4$	

[table continued on following page]

[Table 1 continued]

<u>Indices</u>	<u>Before Administration of Toxin</u>	<u>24 Hours After Administration</u>	<u>Increase</u>
Calcium, mg%	11.12 $\pm$ 0.7	9.32 $\pm$ 0.22	<0.05
Inorganic Phosphorus, mg%	8.28 $\pm$ 0.41	7.45 $\pm$ 0.38	
Reserve Alkalinity, % CO	450 $\pm$ 5	437 $\pm$ 20	

Disorders in the protein composition of the serum were an increase in the alpha and beta globulin content and a decrease in the albumin and gamma globulin content. Acidosis increased in the blood.

The pathological and anatomical picture in acute and subacute experimental fusario-T-2-toxicosis is primarily identical and the difference is only in the degree to which the changes are manifested. The basic changes are catarrhal-hemorrhagic inflammation of the mucous membranes of the gastrointestinal tract and hemorrhaging under the endocardium and serous capsule of the spleen. In subacute toxicosis, necrosis of the mucous membrane of the esophagus and stomach was detected at the mouth of the esophagus in the form of a pityroid deposit and marked degenerative changes in the liver.

Table 2

## Change in Body Weight

<u>Period</u>	<u>Average Daily Increment in Body Weight, kg</u>		<u>Body Weight, kg</u>	
	<u>Experiment</u>	<u>Control</u>	<u>Experiment</u>	<u>Control</u>
Before Experiment	191	188	13.6	14
First Week	52	176	13.9	15.3
Second Week	114	324	16.8	17.7
Third Week	308	16	15	18.7

Thus, the research showed that young pigs are extremely sensitive to fusariotoxin T-2. The minimum lethal dose for them was 4 mg/kg, while for sheep it was 8 mg/kg, i.e. twice as much. One-time doses of toxin in the amounts of 3 and 4 mg/kg caused acute toxicosis in pigs, the severity of the clinical manifestation of which increases with the increase in dose. An important defensive mechanism in pigs is vomiting, which we observed in half of the test animals. In this was the young pigs remove the lethal dose of toxin from their stomachs and survive the poisoning.

As a result of suffering T-2 toxicosis the live weight of the animals decreases, their growth becomes stunted, however they subsequently do not lose economic value and are capable of producing high average daily increments.

In accordance with the clinical manifestation, the changes in blood and the pathological and anatomical picture, the fusario-T-2-toxicosis reproduced by us is in many ways identical to the fusariotoxicosis in pigs described by many researchers in experimental and spontaneous toxicoses (A. Ye. Tsvetovka, 1953; G. F. Marchenko, Ye. V. Resnyanskaya, 1960; I. A. Kurmanov, 1963; K. S. Chernov, 1970).

Consequently, T-2 toxin is the main etiological factor in fusariotoxicosis which causes basic pathological changes.

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12793/9835

CSO: 1840/160



STUDY OF  $\delta$ -ENDOTOXIN FROM BACILLUS THURINGIENSIS BY CIRCULAR DICHROISM METHOD

Moscow MOLEKULYARNAYA BIOLOGIYA in Russian Vol 19, No 5, Sep-Oct 85  
(manuscript received 20 Aug 84) pp 1422-1428

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Biology, USSR Academy of Sciences, Moscow

[Abstract] *Bacillus thuringiensis* is a spore-forming bacterium synthesizing protein crystals of  $\delta$ -endotoxin (I) during the sporulation process within the cell. This endotoxin is toxic against lepidoptera larvae. The crystals of I are soluble in alkaline medium and therefore they are active only in such a milieu. One of the factors responsible for high specificity of its entomocidic activity against lepidoptera larvae is the high pH value of their gastric juice (9.5--10.5). Evidently this pH range is optimal for the demonstration of the toxic effect. The question arose whether the changes in the activity resulting from pH and temperature effects were related to alternatives of the special structure of the protein. The goal of this work was to study the effect of pH and temperature on secondary and tertiary structure of I using the circular dichroism method. A pH dependent conformational transition was detected with characteristic symbatic changes of secondary and tertiary structures of I. The temperature induced conformational transition led to irreversible changes in tertiary structure but did not affect the secondary structure. Figures 7; references 37: 9 Russian, 28 Western (3 by Russian authors).  
[128-7813]

INFLUENCE OF BUTYLATED HYDROXOTOLUENE (DIBUNOL) ANTIOXIDANT ON HORMONAL REGULATION IN RATS OF VARIOUS AGES

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 284, No 2, Sep 85  
(manuscript received 28 Mar 85) pp 499-502

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[Abstract] Butylated hydroxotoluene (4-methyl-2,6-di-tert-butylphenyl, ionol, dibunol), has been used in clinical practice for the treatment of cancer, burns and ulcers, prevention of ischemic heart disease and atherosclerosis. This article is a study of the influence of dibunol on functional activity of three endocrine regulation subsystems: the adeno-hypophysis, adrenal cortex and thyroid systems. Dibunol acting on the endocrine system causes essentially a stress state. Regular administration of it (with food) acting as a mild stress factor, 'trains' the endocrine system and thus increases its reliability; it is this training effect which forms the basis of the therapeutic properties of dibunol, including its property of increasing the length of life in experimental animals.

References 14: 11 Russian, 3 Western.

[024-6058]

INFLUENCE OF SUGAR BEET SAPONINS ON ANIMAL BODY

Moscow VOPROSY PITANIYA in Russian No 5, Sep-Oct 85  
(manuscript received 26 Jun 84) pp 55-58

SMOLYAR, V. I., SALIY, N. S., TSAPKO, Ye. V., LAVRUSHENKO, L. F., PAVLYUCHENKO, O. A., GRACHEVA, L. F., TRUNOV, V. I., GULICH, M. P. and YAVORSKAYA, T. K., Scientific Research Institute of Nutritional Hygiene, Ukrainian SSR Ministry of Health, Kiev

[Abstract] Studies were performed involving extraction of saponins from sugar beets in pure form and feeding of 150 white rats with elevated quantities of the saponins over a long period of time. Physical activity, antitoxic function of the liver, glucose content, total cholesterol, triglycerides, a-, b- and pre-b-lipoproteins were studied in the blood serum, as well as the quantity of erythrocytes, leukocytes and hemoglobin in the peripheral blood. The rate of mitochondrial respiration in the liver and the status of oxidative phosphorylation and glycogen content were studied. Osmotic resistance of erythrocytes was also determined. The use of sugar beet saponins at 50 to 100 times normal was found to cause toxic damage to the

liver with changes in the metabolism of various substances, particularly proteins, manifested as a disruption in the structural organization and dystrophic changes in liver cells. Decreased osmotic resistance of erythrocytes was observed, probably a result of their partial absorption in the intestine. A decrease in mitochondrial liver respiration coefficient and phosphorylation coefficient were also observed. Figures 2; references 17: 13 Russian, 4 Western.  
[076-6508]

UDC: 615.918:582.282].015.4

BIOCHEMICAL, HEMATOLOGIC AND IMMUNOLOGIC CRITERIA FOR EVALUATING CHRONIC  
T-2 MYCOTOXICOSIS IN MICE

Moscow VOPROSY PITANIYA in Russian No 4, Jul-Aug 85  
(manuscript received 3 Dec 84) pp 60-64

KRAVCHENKO, L. V., LEVITSKAYA, A. B., AVRENYEVA, L. I., KRANAUSKAS, A. E.  
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[Abstract] Trichothecene mycotoxins or fusariotoxins, including T-2 toxin, are a group of compounds whose toxic properties result from the presence of epoxide in their structure. Elementary mycotoxicosis, resulting from contamination of food and feed by microscopic fungi producing trichothecenes are among the most common mycotoxicoses in humans and agricultural animals. This article attempts to develop criteria for evaluating the chronic effect of T-2 toxin by studying the influence of long-term administration of low doses of this mycotoxin on a number of biochemical, hematologic and immunologic characteristics in mice. Studies were performed on two hundred male mice receiving either 120th-115th LD<sub>50</sub>, causing minimal biochemical changes, or 100th LD<sub>50</sub> of T-2 toxin in 1% aqueous ethanol six times per day. Mice in the control group received an equal quantity of solvent alone. Blood was taken once per month to study the dynamics of the change in content of hemoglobin, number of erythrocytes, leukocytes and to determine the leukocytic formula. The results indicate the desirability of combined study of biochemical, hematologic and immunologic indices in evaluating the chronic effects of low doses of trichothecene mycotoxins. The most sensitive and persistent indicators are decreases in the activity of a combination of lysosomal hydrolases in the blood serum. Persistently reduced levels of the enzymes in the blood serum were observed even at low levels of contamination of the food with the toxin. Figures 3; references 23: 14 Russian, 9 Western.  
[075-6508]

SPECIFIC BINDING OF  $\sigma$ -OPIOID RECEPTOR LIGAND N-ALLYLNORMETAZOCINE (SKF 10047) TO HEPATIC MEMBRANES

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 11, No 10, Oct 85  
(manuscript received 22 Feb 85; in final form 12 May 85) pp 1380-1384

SAMOVILOVA, N. N., YARYGIN, K. N. and VINOGRADOV, V. A., All-Union  
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[Abstract] Wistar rats were employed in a study to determine the distribution of  $\sigma$ -opioid receptors in tissues other than the CNS, using N-allylnormetazocine (SKF 10047) as the ligand binding specifically to this class of opioid receptors. Scatchard plots led to the identification of a binding site with a dissociation constant of 190 nM, and a receptor concentration of 9300 fmoles/mg of protein. In analogy to the CNS  $\sigma$ -receptors, the receptors in the liver failed to bind classical opiates (morphine, naloxone) and the endogenous opioids. In addition to N-allylnormetazocine and bremazocine, the hepatic receptors bound a number of psychotropic agents (haloperidol, imipramine, phenycyclidine, etc.). Similar receptors were also identified in the human liver and that of Balb/c mice. The physiological significance of such receptors in the liver is unclear, although preliminary studies have indicated the presence of an endogenous inhibitor that prevents binding of tritiated SKF 10047. Figures 4; references 14: 1 Russian, 13 Western. [172-12172]

## STRUCTURE-ACTIVITY RELATIONSHIPS IN MUSCARINIC AGONISTS VIS-A-VIS ACETYLCHOLINE RECEPTORS: THREE CLASSES OF AGONISTS

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 11, No 10, Oct 85  
(manuscript received 1 Feb 85) pp 1391-1401

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[Abstract] A novel approach was taken to the analysis of structure-activity relationships of muscarinic agonists by correlating binding constants with acetylcholine receptors with partition coefficients of the agonists in water:octanol system. Log-log plots of both constants revealed significant correlations and led to the identification of three classes of agonists on the basis of their chemical characteristics, summarized in tabular form. Basically, the agonists were characterized as to four parameters: ammonium group with alkyl substituent (fragment Y), ester group or a replacement group (fragment X), carbon linkage chain between Y and X (fragment A), and substituent on fragment X (fragment R). Within each class the binding constant

increased with an increase in the partition coefficient, accounting for three types of agonist-receptor complexes. Most important in determining agonistic behavior was fragment Y, followed by fragment X. Figures 2; references 31: 10 Russian, 21 Western.  
[172-12172]

UDC 577.175.8.02

STRUCTURE-ACTIVITY RELATIONSHIPS IN MUSCARINIC ANTAGONISTS VIS-A-VIS  
ACETYLCHOLINE RECEPTORS: FOUR MODES OF ANTAGONIST-RECEPTOR BINDING

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 11, No 10, Oct 85  
(manuscript received 1 Feb 85) pp 1402-1416

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[Abstract] Structure-activity relationships of muscarinic antagonists was analyzed by correlation of the bindings constants for acetylcholine receptors with the partition coefficients of the antagonists in a water:octanol system. The assumption was made that the antagonists are capable of reacting with the receptor in several different ways, depending on their chemical characteristics, with the additional postulate that a transition of the antagonist into the hydrophobic phase of the receptor need not occur. Log-log relationships between the binding constants and partition coefficients were interpreted in terms of an antagonist with an ammonium group with alkyl substituents or tert-butyl group (fragment Y), an ester group or replacement group (fragment X), a carbon chain between fragments X and Y, and a substituent on group X (fragment R). These correlates led to the identification of four antagonist-receptor binding modes. In distinction to agonists, fragments Y (ammonia) and X (ester) are not absolute prerequisites for binding to muscarinic acetylcholine receptors. Figures 3; references 11: 4 Russian, 7 Western.  
[172-12172]



ANTIDIARRHETIC ACTIVITY OF MICROSOMAL ENZYME INHIBITOR 2-( $\alpha$ -HYDROTETRAFLUOROETHYL)BENZIMIDAZOLE

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 284, No 6, Oct 85  
(manuscript received 12 May 85) pp 1492-1494

FOKIN, A. V., academician, ASTASHKIN, Ye. I., PRIKHODKO, A. Z.,  
RYABICHENKO, V. V., NIKOLAYEVA, I. S., SLAVICH, Yu. V. and KOLOMIYETS, A. F.,  
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Kupavna, Moscow Oblast and Institute of Metalorganic Compounds  
Imeni A. N. Nesmeyanov USSR Academy of Sciences, Moscow

[Abstract] Activity of 2-( $\alpha$ -hydrotetrafluoroethyl)benzimidazole (I) was studied on C57BL male rats showing that it possessed a definite inhibitory action towards microsomal monooxygenase activity. I suppressed more of the activity connected with the P-448 cytochrome than that of cytochrome P-450. It also suppressed the action of cholera toxin by affecting the activity of adenylate cyclase of epithelial cells of the small intestine. References: 11 (Western). [179-7813]

## EFFECT OF MONOAMINERGIC SYSTEM AND CORTICOSTEROIDS ON GROUP BEHAVIOR OF COCKERELS. (PART 2. EFFECT OF ADRENERGIC RECEPTOR STIMULATION)

Vilnius TRUDY AKADEMII NAUK LITOVSKOY SSR: SERIYA V. BIOLOGICHESKIYE NAUKI  
in Russian No 1(89), May-Jun 85 (manuscript received 14 Feb 84) pp 76-80

SIVITSKENE, Ya. V., Institute of Zoology and Parasitology, LSSR Academy of Sciences

[Abstract] Effect of exogenous catecholamines (adrenaline and noradrenaline) on group behavior of cockerels was studied: hard pecking, pecking at the heads, combat with the chest, chasing, running approach, rotary movement, jumping up and down and general activity. In addition the effect of adrenoreception block was investigated in early ontogenesis. The following doses were used on 1 to 65-day-old white leghorn I cockerels: noradrenaline (15), adrenaline (20), dibenamine ( $\alpha$ -adrenoreceptor: 500) and inderal ( $\beta$ -adrenoreceptor: 2000  $\mu$ g per kg body weight). The study showed that single administration of physiological doses of noradrenaline during early post-natal ontogenesis and multiple doses at later periods showed insignificant effects on the frequency of group behavior elements. Similar effect was found with adrenaline. Trace changes in the behavior of cockerels caused by administration of adrenoreceptor blockers could be normalized by exogenic noradrenaline or adrenaline. References 6: 3 Russian, 1 Western. [1000-7913]

ENKEPHALIN ANALOG DALARGIN ACCELERATES REGENERATION OF HEAD END OF  
PLANARIUM BODY

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 284, No 2, Sep 85  
(manuscript received 15 Jan 85) pp 481-483

SHEYMAN, I. M., TIRAS, Kh. P., VINOGRADOV, V. A. and YEFIMOV, I. A.,  
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Oblast

[Abstract] A study was made of the influence of opioids on the course of regeneration of the head end of the body of the planarium *Dugesia tigrina*. The enkephalin dalargin, hexapeptide Tyr-D-Ala-Gli-Fem-Leu-Arg, an effective antiulcer preparation, was studied by placing the animals after fixation of the forward third of their bodies in a dalargin solution. The course of restoration of the excised body portions was recorded beginning after two days. Each experimental group included 30 animals, series repeated three times. The T criterion of Student was used to evaluate the results. The criterion  $K_B$  was higher in the experimental group than in the control in all measurements. The dose dependence of dalargin was studied in a separate series, which showed maximum stimulation at concentrations of  $10^{-7}$  to  $10^{-9}$  M on the third day of the experiment. Naloxon, an opiate receptor antagonist, eliminated the stimulating effect of dalargin. Figures 2; references 6: 5 Russian, 1 Western.  
[024-6508]

## CELLULAR ACTIVITY IN DOG FRONTAL CORTEX IN RELATION TO PERCEPTION OF MEANING OF CONDITIONED STIMULI

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 285, No 2, Nov 85  
(manuscript received 3 Apr 85) pp 497-499

VARTANYAN, G. A., PIROGOV, A. A. and HSABAYEV, V. V., Scientific Research Institute of Experimental Medicine, USSR Academy of Medical Sciences, Leningrad

[Abstract] Electrophysiological determinations of neuronal activity in the frontal cortex of dogs was assessed in relation to meaning perception of conditioned stimuli (sound), using a salivary reflex model. A class of neurons (28% out of 105 monitored cells) was identified which responded with an increase in the discharge frequency to the conditioned stimulus: an on-reaction with a 60-300 msec latent period of 1.3-2.5 sec duration with 18 sec stimulus. The response to signals with a positive or differential meaning, however, evoked in a specific responsive neuron a specific inter-pulse interval related to stimulus evaluation. For a positive conditioned stimulus the interval duration was 0-20 msec, and for a differential stimulus 60-80 msec. An interval of 100-120 msec was lacking in informational content. Each neuron in the responsive class coded the significance of a stimulus with an interval parameter characteristic of it alone. Figures 2; references 9: 7 Russian, 2 Western.  
[169-12172]

UDC 612.766.1-02:547.262]-07

## EFFECT OF ALCOHOL ON PSYCHOPHYSIOLOGICAL STATE AND WORK FITNESS OF MAN (CHRONOPHYSIOLOGICAL STUDY)

Moscow GIGIYENA TRUDA I PROFESSIONALNYYE ZABOLEVANIYA in Russian No 8, Aug 85 (manuscript received 5 Feb 85) pp 1-5

LATENKOV, V. P., Tyumen Medical Institute

[Abstract] Chronophysiology, the study of the temporal characteristics of physiological processes, is receiving increasing attention. This approach was used to study the dynamics of the effect of alcohol on psychophysiological state and work capacity in healthy people and to clarify the complete recovery time from alcohol-induced changes. Ten healthy test subjects were compared to twenty controls, all ages 20-26. Subjects were administered 40% alcohol to average intoxication, at 5 to 6 pm. Gas chromatography indicated complete elimination of alcohol in 12-15 hours. The negative effects of alcohol on state of health, activity, mood and intellectual work capacity were found to last up to 51 hours and to have a periodic character. Physical work capacity

normalized at 27 hours, fell again at 33-39 hours and returned to normal after 45 hours. The excitability and lability of the visual analyzer exhibited similar changes. Psychomotor reactions, mobility of nervous processes and attention span returned to their initial values after 27 hours. The latent period of the differential visual-motor reaction was most informative as to the state of the subject. The data indicate that the temporal periods for oxidation of alcohol and reduction of optimum state in the organism do not correspond. Alcohol oxidation takes 12-15 hours while psychophysiological state and work capacity are sharply decreased at 21-27 hours and do not return to normal until 45-51 hours after intoxication. This fact should be taken into account during medical examinations for work fitness. Measurement of the time of psychomotor reaction, such as the differential visual-motor reaction, is recommended in this regard. References 19; 12 Russian, 7 Western.  
[067-12126]

/9835

## PUBLIC HEALTH

### PUBLIC HEALTH-85

Riga NAUKA I TEKHNIKA in Russian No 10, Oct 35 pp 11

[Article text by A. Abeltinsha, photographs by M. Kundzinsha]

[Text] For the third time, achievements in medical technology and pharmacy were displayed at the Moscow International Exhibition. More than 1,000 firms from 24 countries participated. During the time elapsed from the previous exhibition, biology and medicine have been enriched by new discoveries, and the mechanisms which govern the course of a whole series of diseases have been revealed. Now, all of these advancements, to a greater or lesser degree are reflected in the technological re-equipment of public health services.

The Soviet Union was represented by more than 4,000 exhibits, among which were many entirely new developments--for example, electronic equipment for processing medical information, microsurgical instrumentation and antibiotics of a wide spectrum of action. A large selection of radiological techniques for diagnostic and therapeutic purposes, apparatus for replacement of organ function, and various prostheses were presented.

An assortment of novelties from other socialist countries were also displayed. Of note, was the exhibit of the Hungarian firm "Medicor", demonstrating methods for use of microelectronics to process medical information. These methods were applied in various forms of apparatus and equipment.

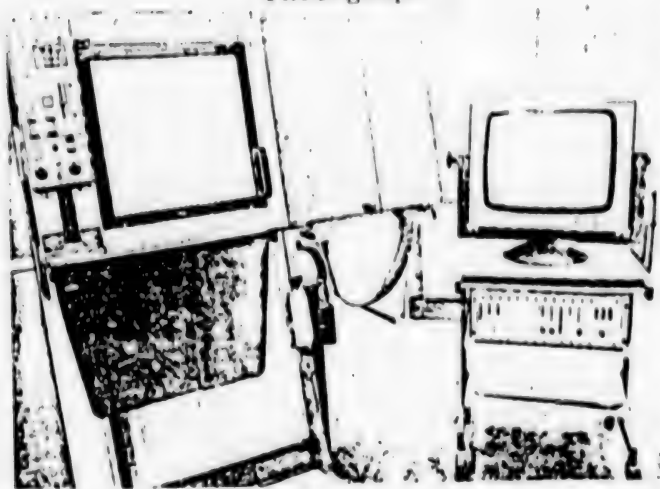
From the capitalist countries, the most extensive display was that of the Federal Republic of Germany. Highly effective medical apparatus, superb optics and various equipment for sports medicine were displayed together.

The wide participation of firms from capitalist countries attests to a desire to collaborate and develop trade with countries from the socialist block, primarily with the Soviet Union.

Visitors to the exhibition could see with their own eyes the many achievements in medical science, technology and practice during the past five years. These achievements have application in public health practice and will increase the effectiveness of disease therapy.



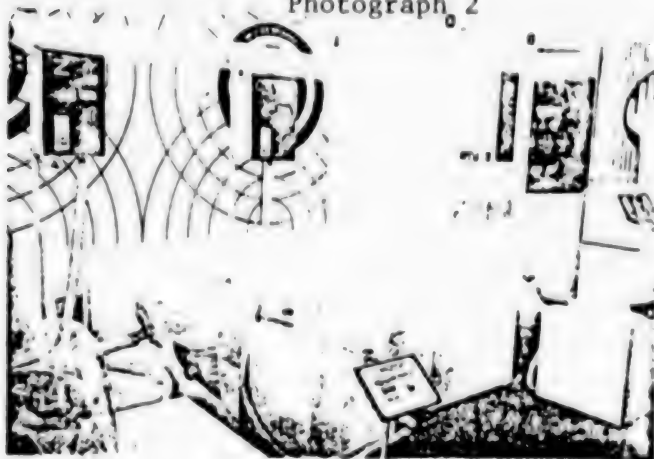
Photograph 1



Концерн «Хирана» крупнейший центр по конструированию и производству медицинской аппаратуры в Чехословакии. Рентгенодиагностическая аппаратура «Хиралюкс» имеет автоматическое управление. Оборудование используется как для обычных, так и специальных рентгеновских исследований.

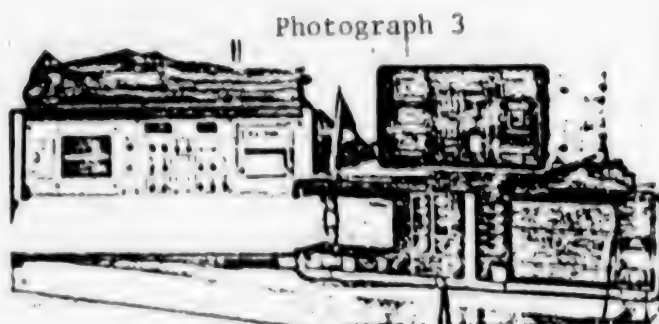
Photograph 1. The "Khirana" concern is a large-scale center for the construction and production of medical apparatus in Czechoslovakia. The radiological-diagnostic apparatus "Khiralyuks" has automatic operation. The equipment is used both for standard as well as special radiological studies.

Photograph 2



В СССР разработана установка аэротерапии с абактериальными изоляторами, предназначенная для лечения ожогов в регулируемой среде, лишенной бактерий. Лечебный эффект создается потоком стерильного воздуха, действующего по запрограммированным параметрам.

Photograph 2. In the USSR, equipment has been developed for aerotherapy with abacterial insulators, intended for burn therapy in a regulated, bacteria-free environment. The therapeutic effect is created by a flow of sterile air, which is activated by pre-programmed parameters.



Photograph 3

Портативная аппаратура французской фирмы из Бордо «Racia S. A.» Вверху: монитор для измерения кровяного давления, основанный на принципах осциллометрии. Позволяет замерять давление без электрического контакта с пациентом. Может применяться и для измерения кровяного давления у детей (при неприменимости обычного метода).

Внизу: ультразвуковой аппарат для определения патологии кровеносных сосудов (аневризм, тромбозов, стенозов и др.). Рядом слева: прибор для записи и анализа биотоков головного мозга. Применяется в нейрохирургии, реанимации и интенсивной терапии.

Photograph 3. Portable apparatus from the French firm, located in Bordeaux, "Racia S.A." On top, is a monitor for measurement of blood pressure, based on the principles of an oscillometer. This equipment allows measurement of pressure without electrical contact with the patient. It can also be used for the measurement of blood pressure in children (given the inapplicability of standard methods). On the bottom, is an ultrasound apparatus for determination of pathology in the blood vessels (aneurism, thrombosis, stenosis and others). In a row on the left, is equipment for tracing and analysis of biocurrents of the brain. It is used in neurosurgery, resuscitatorial and intensive therapy.

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CSO: 1840/145

#### BRIEF

HEART DRUG SHORTAGE--Kagan--Two years ago, the problem of obtaining Validol and nitroglycerine did not exist in the pharmacies of Kagan and Bukhara. But it is already a year that these tablets are in short supply. Moreover, they are issued only on a physician's prescription. More than one hour of worktime is sometimes spent in polyclinics. Frequently for nothing. The prescription is not written up for the drug is not at the pharmacy. The tablet problem must be solved. The oblast pharmacy administration should establish uninterrupted sale of this simple and so necessary medicine and remove all restrictions so that as before a patient can buy them not only in a pharmacy but also at pharmacy stands. [Text] [Tashkent PRAVDA VOSTOKA in Russian 9 Aug 85 p 3] 7697

CSO: 1840/2088

## COOPERATION IN FIELD OF MEDICAL SCIENCE

Moscow EKONOMICHESKOYE SOTRUDNICHESTVO STRAN-CHLENOV SEV in Russian No 7, Jul 85 pp 48-50

[Article by Academician Atanas Maleyev, minister, chairman of the Bulgarian Academy of Medicine]

[Text] Science today finds itself at that level of development where only coordination and cooperation of the scientific research of different countries can lead to significant and effective results. This to a large degree applies to medical science, inasmuch as the solution of a number of its current, vitally important problems would be unthinkable without unification of the efforts of scientific personnel of many countries.

Particularly fruitful has been the cooperation of medical scientists from the countries of the socialist community which has now continued for three decades. It rose to a qualitatively new level in 1975 following the creation of the CEMA Permanent Commission for Cooperation in the Field of Health Care. Its work and the results of Bulgaria's participation in it attest to the high level of effectiveness of international cooperation in health care, medical science and technology.

The introduction of new methods of prevention and treatment developed by scientists of CEMA member-countries have made it possible during these years to reduce such widespread infectious diseases as measles, which in most of the fraternal states has become a sporadic disease, rabies, tetanus, diphtheria and others.

Methods of prevention, treatment and rehabilitation of patients with cardiovascular ailments help to restore health and working capacity in many persons who have suffered such grievous ailments as myocardial infarct and cerebral hemorrhage. Significant successes have been achieved in the treatment of malignant neoplasms with the use of irradiation and chemical medication. New methods have been widely adopted of preservation and transplantation of kidneys in accordance with the scientific program "Transplantation of Organs and Tissues" and an Intergovernmental Agreement on Creation of the Intertransplant System.

Joint studies on hygiene of the environment and labor are being utilized by the countries of the socialist community for the establishment of sanitary norms and legislation. They contribute to the prevention of occupational diseases. These studies have gained recognition in such organizations as the World Health Organization and the International Program on Safety of Chemical Agents. Certain achievements exist in the creation of new medical equipment and medicines and their availability for the health care of CEMA member-countries.

For the solution of major problems facing medical science, more effective organizational forms of cooperation are required. In this regard, new tendencies of broad cooperation in the conduct of scientific research and the creation of temporary international collectives deserve consideration. The methodological documents adopted by the Commission ("Criteria of Planning Subject Matter," "Descriptive Document of Theme," "Criteria of Evaluation of Completed Studies" and others) contribute to improvement of planning of joint scientific subject matter, increased responsibility of interested organizations as well as effectiveness of cooperation as a whole.

Bulgaria takes an active part in the work of the Commission. Together with other fraternal countries, it works out and solves current problems of health care, medical science, technology and pharmaceuticals. Broad use is made in the country of the latest methods of prevention, diagnosis and treatment. A large body of scientific information and documentation has been accumulated and progressive approaches to the conduct of research are approved. Bulgaria in its turn provides the fraternal states information of interest to them, actively participates in joint analytical studies and also provides competent assistance in training of specialists from CEMA member-countries at the present level.

For the development and improvement of international scientific and technical cooperation, an invaluable role was played by the creation of the Bulgarian Medical Academy (MA). Its institutes, as powerful units in which highly skilled personnel and modern equipment are concentrated, have made it possible to conduct complex research on the most important and pressing directions of medical science and health care. International prestige of the academy has grown significantly and its scientific institutes in joint work with foreign colleagues have shown themselves to be equal and competent partners. Thus, the Scientific-Research Institute of Hygiene and Occupational Diseases performs the functions of an international coordinator on the complex problem Labor Hygiene and Occupational Diseases.

At the present time, institutes of the Bulgarian Medical Academy are taking part in CEMA organizations in the development of 85 themes relating to the study and solution of basic questions in the field of cardiovascular diseases and malignant tumors, infectious and parasitic diseases, environmental hygiene and occupational diseases, care of the health of mother and child, radiobiology and others. As a result of this research, knowledge of the pathogenesis and clinical characteristics of some of the most widespread and severe diseases has been enriched, their diagnosis was improved, prevention, treatment and rehabilitation of patients were further improved.



Protection of the environment, creation in industry and in everyday life of the necessary sanitary and hygienic conditions and elimination of the causes of occupational diseases and other factors negatively affecting the health occupy a significant place in the joint scientific-research work of Bulgaria with other countries of the socialist community.

The Bulgarian side has worked out a number of sanitary norms, standards, methodological instructions and other documentation for the exercise of sanitary control over pollution of atmospheric air. A system has been created of very rapid methods and aids for fast linear calorimetric analysis of gas pollutants of the air and certain biological media. Methods were developed for evaluating contamination of surface water with pesticides and determining harmful substances in drinking water. A methodological scheme was prepared for the study of polymer construction materials and criteria were established for their hygienic appraisal. Methodological recommendations were introduced for examination of the working capacity of workers subjected to the action of vibration together with instructions for improving the conditions of their work. A program was compiled for prevention of noise impact on operators employed in automated production operations at chemical, metallurgical and power-engineering enterprises. Methodological instructions were developed and are being used for control of toxic substances in the air of a work zone.

For the proper realization of prevention of poisoning, a map of Bulgaria with indication of the presence of toxic substances in industry and agriculture was compiled for current surveillance. Special emphasis is being placed in this connection on poisoning with remote consequences--with a cancerogenic and teratogenic effect. A result of this work is the development of new labor legislation for the prevention of poisoning. Bulgarian scientists are the first in the world to propose a new type of hygienic norm--minimal time of safe work on plots of land following their treatment with pesticides.

The achievements of radiology and radiobiology in health care are primarily the result of fruitful international cooperation of CEMA member-countries. Several tens of counterradiation [protivoluchevyye] preparations were synthesized and tested in Bulgaria. The influence of the nuclear industry and power energetics on radiation was widely investigated in a number of the country's regions. Bulgarian radiobiologists have made a significant contribution to the development of space biology and medicine. Our country has become a regular and active participant of the Interkosmos Program.

In recent years, scientific cooperation of Bulgaria with the fraternal countries has been expanded and strengthened in the study of infectious and parasitic diseases. A considerable exchange of information, documentation, methods and technology has been carried out thanks to which resources and time have been saved. New diagnostic and therapeutic methods were jointly developed and normative documents of exceptional value for applied scientific work in the struggle against these diseases were prepared.

Reference should be made to successes in the complex study of influenza. On

the basis of careful observation and analysis of the structure and variability of viruses, Bulgarian scientists have made important conclusions relative to change in the epidemiological process and prediction of influenza epidemics. On their basis, there were developed and introduced into practice a system of epidemiological control and a mathematical model for the forecasting of natural variability of viruses, which served as the basis for carrying out prevention of influenza with the aid of vaccines. A technology was developed of producing live and non-live influenza vaccines as well as a therapeutic model of intensive treatment of severe and complicated forms of influenza.

Problems are being successfully solved connected with diagnosis of viral hepatitis. Highly sensitive preparations have been made for the detection of viral hepatitis. For the purpose of prevention and treatment of a number of ailments, production has been organized of gamma globulin for venous administration.

Achievements in the struggle with infectious diseases have positively changed the epidemiological situation in our country. It now is among the most developed countries in a sanitary sense.

In Bulgaria, the results of international scientific and technical cooperation in the diagnosis, treatment and prevention of the most prevalent ailments such as cardiovascular diseases, a cause of mortality in active middle age of the population, are being widely utilized. Joint research has been conducted on arterial hypertension in adults and children, as a result of which data have been obtained on the mechanisms of its genesis.

As the result of joint developments in further improvement of surgery, new methods have been adopted of treating patients with affected large vessels, inherited and acquired heart diseases. Development of coronary surgery has been started.

Considerable attention is being given in the country to prevention, early diagnosis and complex treatment of the most widespread malignant neoplasms. Modern research methods are being used. Operative and medicinal treatment has been improved. Bulgarian specialists took part in the creation of a joint monograph "Immunological Research of Cancer in CEMA Member-Countries."

Problems of transplantation of organs and tissues are the subject of multilateral cooperation of Bulgaria. In Bulgaria problems of transplantational immunity are being successfully studied.

Special significance is attached to care of the rising generation in the social policy of communist and workers parties.

The protection of mother and child is an important direction of multilateral cooperation of the countries of the socialist community. In the struggle to boost the birthrate, problems of infertility occupy an important place. Considerable attention is being given to early diagnosis and treatment of intrauterine and genetic diseases in children. Research results in the field of child nutrition have made it possible to establish commercial production of milk replacing mother's milk and prepared nutritive mixtures.

As a result of multilateral cooperation, more than 55 clinical and laboratory methods have been standardized, which has made it possible to use standard apparatus in clinical laboratories as well as reagents and test kits produced in the fraternal countries.

One of the tasks of health care in Bulgaria is prevention of ailments through timely detection of patients as well as implementation of sanitary measures. This is why development of methods of complex study of the population's state of health and also improvement of forms and methods of health-care management are so valuable.

Good information servicing of scientific research is a guarantee of successful and quality work. Bulgaria actively participates in the operation of the Medinform System.

In conclusion, it can be said that thanks to fruitful international cooperation with CEMA member-countries, the scientists of our country have achieved definite successes in the development of health care of which we are proud. A number of discoveries have received world recognition. Their use contributes to raising the quality of the population's medical services and to fortifying its health.

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## POSTWAR HUNGARIAN HEALTH-CARE DEVELOPMENTS

Moscow EKONOMICHESKOYE SOTRUDNICHESTVO STRAN-CHLENOV SEV in Russian No 7,  
Jul 85 pp 51-54

[Article by Dr Imre Hutas, state secretary of the Hungarian Ministry of Health: "Health Care--a State Concern"]

[Excerpts] This year the Hungarian People's Republic celebrated the 40th anniversary of the liberation of the country from the fascist yoke by forces of the Soviet Army. In the course of the war, millions of people were killed, hundreds of buildings were transformed into ruins. And the network of medical aid was destroyed.

The Soviet Union provided much assistance in the restoration of Hungary's national economy, including health care.

1948 was a crucial year in the history of our country: Hungary's development took the path of socialism under the guidance of the Communist Party.

### Formative Period

There began the creation of a system of socialist health care. During those years, many outstanding Soviet medical personnel came to Hungary. They helped to organize medical aid along different directions, first of all in the organization of a sanitary and epidemiological network and services for the protection of maternity and childhood as well as in the struggle against tuberculosis. Familiarization with the methods of Soviet specialists significantly speeded up the formation of these systems.

On the example of the Soviet Union, we began to form even back in the '50s "hospital-polyclinic" units, which at the present time occupy a leading position in the Hungarian system of health care. Soviet methods were also used in the organization of state specialized institutes which have become an important basis for the exercise of professional supervision and control in different fields of medicine.

After the difficult restoration period, the principle of free medical aid began to be increasingly widespread first for workers of industrial



enterprises and then for agricultural workers. Since 1975, it has been the right of each Hungarian citizen.

The extensive period of the sector's development was accompanied by rapid growth in the number of physicians and the number of hospital beds. At the same time, requirements grew faster than material possibilities. The bed fund had to be frequently increased in hospitals of the old type, sometimes using buildings of former palaces. Of course, this brought in its wake a multitude of problems: crowding of accommodations, difficulty of further modernization and so forth. Moreover, prior to liberation, the country's peasantry practically had no access to a health-care system. For this reason, the first priority was to build 400-500-bed hospitals in small towns. They included basic medical specialties.

The difficult epidemiological situation caused by illnesses from tuberculosis also required a significant increase in the number of beds. Consequently, in one plan period, seven sanatoriums were established for tubercular patients, with 300 beds in each. In the organization of these sanatoriums, their subsequent reorganization for other health-care purposes following the eradication of this disease had been proposed from the very beginning.

At the present time, departments of cardiological rehabilitation and therapeutic departments or subdivisions for the rehabilitation of persons with ailments of the support and motor apparatus [oporno-dvigatel'nyy apparat] are being organized in them.

A system of preventive aid has been organized in the country. At the present time, 99.1 percent of the children receive inoculations against basic infectious diseases. Because of this, such formerly widespread diseases as diphtheria, whooping cough, poliomyelitis and children's tuberculosis have disappeared. Total medical preventive examinations of the population for pulmonary diseases are being carried out at permanent and mobile stations.

#### Achievements and New Tasks

At the present time, the creation of a network of medical services has been entirely completed. There are on the average 2,500 persons per medical district, and even the smallest inhabited places are provided with fixed or ambulatory medical assistance. Children up to 14 years of age are served by pediatric districts, which operate in the larger populated centers, but even now they encompass 50 percent of the children. There, where there is no permanently functioning pediatricist, medical assistance is provided to children by traveling brigades of physician-specialists.

At industrial enterprises, primary medical and sanitary, preventive and therapeutic aid is provided by physicians of medical and sanitary units. At the same time, special attention is paid to preventive medical examinations. In recent years, medical and sanitary units and industrial medicine services have been created at large agricultural enterprises. They frequently combine their work with territorial district assistance.



Hungarian health care is based on a system of graduated medical services. The physician of a primary medical and sanitary aid station directs a patient to a polyclinic for laboratory examinations or for consultation with a physician-specialist. Practice shows that a multi-type polyclinic is a viable unit only where it has close professional and economic connections with an inpatient institution.

Inpatient assistance is provided by city or regional hospitals where almost all the medical specialities are available and where a high level of service is provided. In special cases (heart operation, kidney transplantation), the patient is sent to regional centers or state institutes.

In Budapest, where 20 percent of the population lives and in 19 large administrative units (regions), a network of hospitals has been practically created. New multi-type regional hospitals have been built or modernization has been carried out (or started) of old hospitals, as a result of which central operative units and well-equipped diagnostic departments have emerged. The central operative and centralized anesthesiological services make it possible to effectively utilize operative services and their personnel. Postoperative departments exist.

As a result of the development of the hospital network, the number of hospital beds in Hungary by the end of 1985 will exceed 100,000, that is, it will reach 96 beds per 10,000 persons, which corresponds to the average European indicator. The number of physicians will be about 28,000, or 3.5-fold greater than was the case in 1945. The total number of physicians in the country (together with physicians on pension) amounts to 34,000. Among the newly created medical institutions, mention should be made of the Budapest State Institute of Traumatology built according to the latest requirements of medical practice and provided with the most modern instruments and equipment.

#### Active Cooperation

In the development of Hungarian health care, in upgrading of the professional level of medical personnel, in provision of medical institutions and institutes with instruments and equipment, the multilateral cooperation of the fraternal countries has been of great value. In its deepening and further development, a determining role is played by the work of the CEMA State Commission for Cooperation in the Field of Health Care. At the present time, 13 complex problems are being worked on, owing to which our research institutions are taking part in the preparation of 160 themes and as work coordinators for 30 of them.

The value of the multilateral ties of the countries of the socialist community is that it is possible by means of division of labor to more quickly and with lower costs solve individual problems of medical science. Thus the results of cooperation in the field of cardiovascular diseases have found wide application in clinical practice. In nonmedicinal treatment of ailments of coronary vessels, so-called polysurgical methods with employment of catheterization of the heart have been introduced in Hungary. They make it possible in two-thirds of the cases to remove in the first hours of a fresh

infarct the obstruction in the vessels. Utilizing the experience of specialists of the USSR and the GDR, the method has been successfully used in 100 cases at the Hungarian State Cardiological Institute. Moreover, a method has been introduced of expanding significant constrictions of the proximal sectors of the large coronary vessels with the aid of a balloon catheter. As of now, 50 such interventions have been successfully carried out at the Hungarian State Cardiological Institute.

Medical centers of Hungary, GDR, USSR and Czechoslovakia are actively cooperating in the study of ischemic changes of the cardiac muscle with the aid of radioisotopes. In all of the centers, work has been done on perfusion of the cardiac muscle of patients with the same ergometric load for the determination of reversible and irreversible disruptions in blood supply (in Budapest, 350 patients were examined).

In the study of problems of juvenile hypertension, the Hungarian side is an international coordinator. A series of studies was conducted in cooperation with corresponding medical centers according to identical plans. A joint monograph, prepared by them, will be published this year.

Within the scope of complex problems relating to transplantation of organs and tissues, problems were successfully solved of overcoming tissue incompatibility. Laboratories of the cooperating countries exchanged rarely encountered serums. A new program was worked out on an electronic computer for selection of compatible organs of recipient and donor.

Methodological recommendations and requirements worked out in the study of this problem will be gradually used by the cooperating countries in research and evaluation of new medicinal agents. The use of standardized recommendations as well as experience in this field makes it possible for CEMA member-countries to undertake simultaneous research of medicinal agents.

The international coordinator of the problem Chemotherapy of Neoplasms is the Hungarian State Oncological Institute. There has been functioning at the institute for a number of years a center for testing substances for the prevention of neoplasms under clinical conditions. Its objective is centralized distribution of investigated medicines as well as generalization and processing of the obtained results. Up to the present time, 10 medicinal agents and their combinations have been approved. Another 10 kinds of medicinals are now being studied.

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# ESTIMATING EFFECTIVENESS OF CONTINUING EDUCATION OF PHYSICIANS

Moscow SOVETSKOYE ZDRAVOOKHRANENIYE in Russian No 8, Aug 85  
(manuscript received 10 Dec 84) pp 30-35

SIMBIRTSEV, S. A., professor, KROM, L. I., candidate of medical sciences  
and SMIRNOVA, T. P., Leningrad Institute for the Advanced Training of  
Physicians

[Abstract] The effectiveness of continuing education is estimated on the basis of the introduction of new methods to the daily work of physicians following continuing education courses. Information on the subject was obtained from the reports of physicians as they entered courses on the introduction of new methods following previous courses, as well as plans for future introduction to practice of the knowledge and skills obtained at the courses. The article summarizes the results of the responses of 7% of persons attending continuing physicians education courses at the Institute in 1983. The estimation was based on the number of new methods introduced by physicians to practice after previous courses, the number of physicians reporting introduction of new methods after such courses, and the distribution of new methods among specialties. The methods used in the article allow quantitative measurement of the effectiveness of continuing education, making it easier for institutes involved in this work to evaluate their contribution to the public health service.

[030-6508]

## EPIDEMIOLOGIC AND HYGIENIC ACTIVITY IN TAJIKISTAN

Dushanbe KOMMUNIST TADZHIKISTANA in Russian 5 Sep 85 p 2

MERKULOV, V.

[Abstract] This is a report of the first Congress of Epidemiologists and Hygienists of Tadzhikistan was opened in Dushanbe. Correspondent's interview with the director of the Tadzhik Scientific Research Institute of Epidemiology and Hygiene, Doctor of Medical Sciences T. M. Tukhtayev. In response to a question concerning achievements of Soviet Tadzhikistan, Tukhtayev notes that antiepidemic measures have been developed and undertaken in the Republic, including prevention of infectious, parasitic and viral disease and the production of bacterial preparations. In recent years, the scientific and technical base of the Republic has expanded with the creation of new departments and laboratories with highly qualified specialists. The Institute presently consists of five departments including ten laboratories, two independent laboratories, libraries and an experimental animal center. Some sixty scientific fellows, including four doctors and 32 candidates of sciences, work at the Institute. The congress under way is reported to include a broad range of problems related to labor hygiene in the transport energy and agriculture, nutritional hygiene, and the toxicology of chemical plant protection substances. The Institute anticipates further expansion in the future to continue the protection of the population from disease.  
[041-6508]

UDC 628.162/.163:658.516

## IMPORTANCE OF DRINKING WATER, QUALITY FOR PUBLIC HEALTH

Moscow ZHILISHCHNOYE I KOMMUNALNOYE KHOZYAYSTVO in Russian No 10, Oct 85  
(manuscript received 8 May 85) pp 21-22

PASKUTSKAYA, L. N. and KRISHTUL, V. P., Scientific Research Institute for Water Quality and Conservation

[Abstract] The article summarizes provisions of the new Soviet water standard, GOST 2874-82, "Drinking Water. Hygienic Requirements and Quality Control." The standard addresses aspects of microbiological, toxicological and organoleptic parameters. Thus, standards for microbes and E. coli strains, minerals such as arsenic, lead, and less harmful but undesirable iron, manganese and hardness salts, as well as appearance, taste and smell are included in the requirements. Control of industrial, agricultural and domestic pollutants is also addressed, regardless of the size of the water system involved. Certain simplifications have been made, including elimination of a standard for silver content, since that metal is not found in centralized water systems, but only appears as a component of water conservation in special processing of local water systems. Similarly,

specifications for radioactive elements have been dropped, since these elements are to be controlled under a separate standard. A single standard is now used for all polyphosphates, and another covers fluoridation (under local ministries of health). More stringent requirements for lower levels of lead and molybdenum, and relaxed control of strontium, manganese and water cloudiness during flood period, are now included. The standard for residual Al has been shifted to the toxicological section, and the pH range has been broadened. Not only ionic but compound forms of minerals are now included under the standard. New emphasis is placed on water sources, and centralized water systems meeting these requirements are prescribed in rural areas.  
[134-12131]

/9835



UDC: 577.391:612

CHOLESTEROL METABOLISM IN BLOOD CELLS OF IRRADIATED RATS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 284, No 2, Sep 85  
(manuscript received 8 Apr 85) pp 510-512

NOVOSELOVA, Ye. G., KULAGINA, T. P., POTEKHINA, N. I., KOLOMIYETSEVA, I. K.  
and KUZIN, A. M., corresponding member, USSR Academy of Sciences, Institute  
of Biological Physics, USSR Academy of Sciences, Pushchino, Moscow Oblast

[Abstract] A study is reported of metabolism of cholesterol in erythrocytes and lymphocytes of the blood of irradiated male Wistar rats. The intensity of uptake of labeled acetate in total lipids and cholesterol was measured in erythrocytes of control and irradiated rats after incubation of cells with  $2\text{-}^{14}\text{C}$  acetate at  $37^{\circ}\text{C}$  for one hour. An increase in cholesterol content of the erythrocytes after whole-body irradiation at 10 Gr was observed, possibly a result of increasing transfer of cholesterol from the plasma into the erythrocyte cells. At radiation doses of 4 and 10 Gr and after one hour the synthesis of cholesterol is activated in vitro, activation being greatest after a dose of 4 Gr. The activation of biosynthesis of cholesterol in the liver to restore the cell membranes of radio sensitive organs does not exclude the possibility of using the internal resources of damaged cells, particularly peripheral blood lymphocytes for restoration of biological structures. References 15: 5 Russian, 10 Western.  
[024-6508]

SOME ASPECTS OF BIOLOGICAL AND CLINICAL EFFECT OF SMALL DOSES OF IONIZING RADIATION ON HUMAN BODY

Moscow VOPROSY KURORTOLOGII, FIZIOTERAPII I LECHEBNOY FIZICHESKOY KULTURY in Russian No 5, Sep-Oct 85 (manuscript received 11 May 85) pp 27-31

DEYETYEN, P., Institute of Physiology and Balneology, Innsbruck University, Austria

[Abstract] The first International Symposium on Radiotherapy was held in 1979 in Bad-Munster-on-Stein covering the following aspects: biological mechanisms of radon radiation, specific effect of X-radiation on the human body, specific indications for radiotherapy and the exposure risk for the technicians and patients. Divergent opinions were expressed on this topic. At this time, three theories exist on the relationship of low radiation dose to bio-medical effects: 1--linear relationship regardless of the dose, 2--threshold radiation effect and 3--biopositive action theory based on the fact that the ionizing radiation affected human beings from their earliest developmental stages. All of these theories are analyzed in view of the accepted concepts of non-threshold effect of ionizing radiation in contrast to newer theories challenging these concepts. Figures 2; references 17 (Western).

[1001-7813]

UDC 612.014.48

DIRECT ACTION OF SMALL RADIATION DOSES ON NEURONS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 284, No 6, Oct 85 (manuscript received 13 Mar 85) pp 1481-1484

PEYMER, S. I., DUDKIN, A. O. and SVERDLOV, A. G., Leningrad Institute of Nuclear Physics imeni B. P. Konstantinov, USSR Academy of Sciences

[Abstract] Ionizing radiation activates electroencephalograms (EEG) and stimulates higher nervous activity (HNA) of humans and animals. A recently developed method of surviving brain-slices cultured in salt solution was used to study direct action of ionizing radiation on functional neurons of mammals. Wistar male rats were used in experiments, the slices being obtained from the hippocampus. It was shown that ionizing radiation had a directly activating effect on endogenous (pacemaker) mechanism of general nerve impulses. This was achieved by radiation doses equivalent to those which activated EEG and HNA of animals and humans. The same effect was observed with application of either x-ray or gamma-radiation. Figures 4; references 7: 2 Russian, 5 Western.

[179-7813]

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UDC 619:576.807.7:616.981.452:636.4

DETECTION OF NEUTRALIZING ANTIBODIES AGAINST CLASSICAL SWINE FEVER VIRUS

Moscow VETERINARIYA in Russian No 7, Jul 85 pp 31-32

VISHNYAKOV, I. F., KURINNOV, V. V., PERETYKIN, A. S., YASHIN, A. T.  
and OLEYNIK, L. Ya., All-Union Scientific Research Institute of  
Veterinary Virology and Microbiology

[Abstract] Inhibition of fluorescent microplaques was employed in analysis of neutralizing antibodies in swine sera against Swine Fever Virus, using piglet kidney cultures grown in Eagle's medium. The resultant data showed that the technique was useful in monitoring levels of immunity in terms of antibodies against the Swine Fever virus, and demonstrated that the levels of immunity were not always of sufficient intensity following vaccination. In particular, low titers or absence of antibodies in suckling piglets indicated that colostrum antibodies do not always insure immunity in the newborn. In addition, the presence of low colostrum-derived antibody levels in the piglets may subsequently inhibit development of active immunity following vaccination. In the latter case only 59% of the pigs developed or showed the presence of specific antibodies 140-200 days after immunization. References 15: 7 Russian, 8 Western.  
[158-12172]

UDC 619:616.988.13:636.4

PREVENTION AND CONTROL OF SWINEPOX

Moscow VETERINARIYA in Russian No 7, Jul 85 pp 35-38

SKALINSKIY, Ye. I., BORISOVICH, Yu. F. and SHTEFAN\*, M. K., All-Union  
GNKI [expansion unknown] of Veterinary Preparations; \*Main Administration  
of Veterinary Medicine, USSR Ministry of Agriculture

[Abstract] A basic review is provided of the clinical course, diagnostic methods, preventive measures and control of swinepox. Of crucial importance in the prevention and control of swinepox is appreciation of epidemiological

characteristics, and the effectiveness of isolation, quarantine, and disinfection when instituted promptly. Control also encompasses monitoring of pork and other products, such as hides and bristles, and the use of effective disinfectants, e.g., hot 2% formalin, 2% (hot) or 4% (cold) sodium hydroxide, or 20% freshly slaked lime. Personnel employed in areas with swinepox outbreaks should be provided with special protective clothing and instructed in safety precautions, such as washing hands with 1% chloramine.  
[158-12172]

UDC 619:616.981.452:636.4

#### NEUTRALIZATION OF CLASSICAL SWINE FEVER VIRUS

Moscow VETERINARIYA in Russian No 8, Aug 85 pp 29-30

MOVSESYAN, A. N. and AYRAPETYAN, V. G. (scientific director, professor)  
Armenian Scientific Research Institute of Veterinary Medicine

[Abstract] The rabbit febrile response to lapinized Swine Fever Virus (SFV) was used to test the response of newborn piglets to immunization with SFV vaccine. Sera obtained from the piglets were mixed with SFV and injected into test rabbits who were monitored for a febrile response (40.1-41.1°C within 46-74 h and maintained for 4-6 h). The results indicated that piglets immunized per os with the vaccine 7-30 days after birth responded with neutralizing antibodies, as did animals immunized at the ages of 3 and 6 months. Animals immunized intramuscularly at the age of 7 or 14 days did not form neutralizing antibodies. However, piglets immunized at days 21 and 30 did, as did those immunized at 3 and 6 months. The rabbit response to lapinized SFV with a characteristic febrile response was shown to be a convenient method of assessing the presence of neutralizing antibodies in test sera.

[159-12172]

UDC 619:616.988.73-085:636.5

#### PREVENTION OF NEWCASTLE DISEASE VIRUS WITH BOR-74 VGNI STRAIN VACCINE

Moscow VETERINARIYA in Russian No 8, Aug 85 pp 30-31

KREYMER, Yu. Kh., All-Union GNKI [expansion unknown] of Veterinary Preparations

[Abstract] Immunization trials were conducted at three farms to test the BOR-74 VGNI strain of NDV as a vaccine in chicks and adult poultry. Intranasal and per os (with drinking water) routes were found effective in yielding 97-100% protection and serum antihemagglutinin levels of ca. 6 log<sub>2</sub> levels. No adverse effects were noted in terms of weight gain

and development, or adult reproductive function. The vaccine prepared from strain BOR-74 VGNKI has been approved for use in veterinary practice.  
[159-12172]

UDC 619:616.981.45:636.294

#### DEER PASTEURELLOSIS

Moscow VETERINARIYA in Russian No 6, Jun 85 pp 37-40

LUNITSIN, V. G. and scientific directors (BAKULOV, I. A., professor and GUSLAVSKIY, doctor of veterinary sciences)

[Abstract] Pathological and bacteriological studies were conducted on pasteurellosis on antlered deer. The causative agent, *Pasteurella multocida*, was found not to differ in any bacteriological or biochemical characteristics from *P. multocida* isolated from other animals. The infection was generally acquired from other sick deer or carriers, or mediated via water, carcasses of dead deer, soil, rodents, etc. The outstanding pathology consisted of a widespread hemorrhagic diathesis of the internal organs, with especially severe lesions in the brain, the cardiovascular system, the respiratory system, and the digestive organs. The clinical manifestations were usually indicative of a predominantly septic course or of pneumonia.  
[157-12172]

UDC 619:576.807.855.76.851.45

#### IDENTIFICATION OF PASTEURELLA MULTOCIDA SEROVAR D

Moscow VETERINARIYA in Russian No 6, Jun 85 p 63

SHEGIDEVICH, E. A., FEDOTOV, V. B. and CHERNUSHKINA, I. V., All-Union Institute of Experimental Veterinary Medicine

[Abstract] A rapid and convenient system has been developed for the identification of the D serovar of *Pasteurella multocida* isolated from various infected animals. Following culture for 18-24 h at 37°C in Hottinger's broth supplemented with 10% equine serum, the test tubes are centrifuged (30 min at 1000 rpm) and the supernatant removed. To 0.5 ml of the bacterial sediment 0.5 ml of acriflavine (trypaflavine) is added, the contents mixed, and the suspension stored for 30 min at room temperature. In distinction to other serovars, the flocculate formed by the D serovar does not break up on shaking. Thus, the use of a 1:1000 acriflavine solution has diagnostic utility in the differentiation of *P. multocida* serovar D from the other serologic groups.  
[157-12172]

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UDC 578.233.33

PRINCIPLES OF SELECTIVE INACTIVATION OF VIRAL GENOME. PART IV. EFFECT OF UV-IRRADIATION OF MS2 PHAGE ON ITS BINDING WITH ANTI-MS2-IMMUNOGLOBULINS

Moscow MOLEKULYARNAYA BIOLOGIYA in Russian Vol 19, No 5, Sep-Oct 85  
(manuscript received 30 May 84) pp 1216-1222

BUDOVSKIY, E. I. and KOSTYUK, G. V., Institute of Bioorganic Chemistry  
imeni M. M. Shemyakin, USSR Academy of Sciences, Moscow

[Abstract] Exposure to UV light is a good method for inactivation of the viral genome used in production of killed antiviral vaccines. In this paper the effect of UV irradiation (254 nm) on antigenic determinants of the MS2 phage membrane protein was described showing that it leads to a decrease of these determinants on the surface of virions (with a cross-section of such a decrease being  $10^{-16}$  mm<sup>2</sup> per photon). The experimental data obtained supported the following mechanism of the UV effect: irradiation leads to a photomodification of aminoacid residues found within the antigenic determinant and further rearrangement of membrane molecule or its redistribution in the virion causes inactivation of antigenic determinants. Figures 4; references 26: 6 Russian, 20 Western (2 by Russian authors). [128-7813]

UDC 619:616-074:616.981.452:636.4

COMPLICATIONS IN DIAGNOSIS OF CLASSICAL SWINE FEVER: LITERATURE REVIEW

Moscow VETERINARIYA in Russian No 9, Sep 85, pp 29-31

VISHNYAKOV, I. F., KURINNOV, V. V. and YASHIN, A. Y., All-Union Scientific Research Institute of Veterinary Virology and Microbiology

[Abstract] A literature review is presented on the difficulties encountered in the diagnosis of Classical Swine Fever. These difficulties arise from the fact that clinical manifestations are dependent not only on the virulence of the virus itself, but are also highly dependent on the physiological and immune status of the individual, including the fact whether a live or killed

vaccine had been previously employed. In addition to individual susceptibility, low-virulence viruses arise as a result of prolonged passage in rabbits or goats. Infection of pregnant females with low-virulence swine fever viruses leads to congenital infections resulting in piglets with immunotolerance and persistent viremia. Variability in herd immunity and in the virulence of the virus further complicate viral circulation in the swine population and render difficult serological and histopathological attempts at diagnosis. References 30: 3 Russian, 27 Western. [161-12172]

UDC 619:616.981.49-036.2:636.32/.38

#### PATHOGENESIS OF INFECTIOUS ENTEROTOXEMIAS IN SHEEP

Moscow VETERINARIYA in Russian No 10, Oct 85 pp 38-40

USTARKHANOV, P. D., Daghestan Scientific Research Veterinary Institute

[Abstract] Immunohistochemical and immunocytochemical studies were conducted on sheep naturally and experimentally infected with *Cl. perfringens* types C and D. Using fluorescent antibodies against the exotoxins the pathogenetic mechanisms were elucidated, and it was demonstrated that the damage to the endothelial lining of vessels represents a primary lesion from which the majority of other manifestations follow. As a consequence, the toxins cause extensive changes in the liver, kidney, lung, brain, and endocrine parenchyma leading to loss of vital functions. The lymphoid system is also seriously affected, leading to impaired phagocytosis and loss of the ability to launch an immune response. Figures 3.

[162-12172]

UDC 619:616.981.42:612.11/.12

#### ANTIGEN-REACTIVE BLOOD CELLS IN HEIFERS VACCINATED AGAINST BRUCELLOSIS

Moscow VETERINARIYA in Russian No 5, May 85 pp 37-38

PROSKURINA, L. I., Semipalatinsk Zooveterinary Institute

[Abstract] Simmenthal breed heifers were immunized with brucella vaccine at 5-6 months of age and followed for antigen-reactive blood cells. Within 7 days of vaccination, a significant rise in peripheral blood leukocytes was observed, which persisted for 2 months. The increase included the T and B cells, as well as polymorphonuclear cells. Incubation of lymphocytes from intact (control) animals with brucellin resulted in a 0.6% decrease in rosette-forming cells. However, after vaccination, incubation of cells with brucellin diminished the percentage of cells capable of rosette-formation by

41.8-49%, 7-18 days after vaccination. Within 1-2 months of vaccination the percentage of cells susceptible to brucellin in terms of rosette formation decreased to 14.3-21.9%, and after 3-6 months to 1.8-2.6%. Ten months after immunization the counts of T helper cells remained statistically elevated, while T suppressor cells were depressed. In addition, the percentage of brucellin-sensitive cells had risen to 10.8%.  
[156-12172]

UDC 619:161.981.452-03:636.4

#### AFRICAN SWINE FEVER: CLINICAL COURSE AND PATHOMORPHOLOGY

Moscow VETERINARIYA in Russian No 5, May 85 pp 45-48

BURLAKOV, V. A., BALABANOV, V. A., GUZOV, A. F., SAMBA, Kr. and MBIMBI, P., Scientific Veterinary Laboratory, Brazzaville, People's Republic of the Congo

[Abstract] In 1982 an outbreak of African Swine Fever was discovered in Buenza district of the Congo which lasted for 3 years. On clinical grounds three clinical entities were distinguished, which were further characterized by serological and histopathological studies. In the acute form the incubation period lasted for 2-4 days with onset of 42°C fever and death within 6-10 days. The animals were lethargic and refused to eat, 2-4 days before death. In the subacute clinical form the incubation period was 2-6 days in duration. The animals were febrile, exhibited episodes of chills, were lethargic and succumbed 10-20 days after infection. In the chronic form the course was similar to that of the subacute form, but interspersed with periods of remission and recrudescence. The animals showed a rapid loss of weight, developed extensive abscesses, edema, pseudotumors, and died within 1-3 months of infection. Histopathologic findings showed extensive changes in virtually all organs and tissues in all three clinical forms of the disease. The changes were essentially dystrophic; there were marked alterations in circulatory supply, karyopexis of the lymphoid tissues, perivascular infiltrates, hemorrhages, and Arthus-like changes. In addition, evolutionary changes in the virus were observed in the course of the pathology, including loss of hemagglutinability, which further complicates diagnosis. Figures 3; references 12: 2 Russian, 10 Western.  
[156-12172]

# WESSELSBRON DISEASE: FOREIGN LITERATURE REVIEW

Moscow VETERINARIYA in Russian No 5, May 85 pp 73-74

PETRACHEV, D. A.

[Abstract] The virus responsible for Wesselsbron disease was first identified in South Africa in 1954, as the agent causing fever and abortions in sheep. The disease is widespread in sub-Saharan Africa, particularly in Rhodesia, Mozambique, Malawi, Zambia, Uganda, the Cameroons, Botswana, Nigeria, Kenya, Angola, Senegal and Sudan. The causative virus has been identified as a flavivirus in the togavirus family, characterized by a single-stranded RNA with a MW of  $4 \times 10^6$  daltons. The virion itself is 30 nm in diameter and has a bilayer membrane. The virus is rapidly inactivated by environmental factors and various chemicals, but is stable over a pH range of 3-9. The mosquito vectors most commonly implicated are *Aedes coballus* and *A. circumluteolus*. Some 43.3-7.4% of human and animal sera tested in the endemic regions are seropositive for the virus. The virus has been cultivated in a number of tissue cultures and experimentally in--in addition to sheep and goats--cattle, horses, swine, albino mice, guinea pigs, rabbits and monkeys. Rats, however, are refractory to infection by this virus.

[156-12172]

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## CONFERENCES

### INTERNATIONAL SYMPOSIUM ON ENVIRONMENT AND WORKING FITNESS

Frunze SOVETSKAYA KIRGIZIYA in Russian 29 Oct 85 p 2

[Text] An international symposium, "The Environment and Human Working Fitness", has been held in Sofia. Taking part in it were representatives of the USSR, France, Japan, the Federal Republic of Germany, Poland, Czechoslovakia, the German Democratic Republic, Hungary and other countries. Among the members of the Soviet delegation were A. A. Aydaraliyev and A. L. Maksimov, heads of laboratories of the Institute of the Physiology and Experimental Pathology of High Elevations.

The main questions discussed at the symposium had to do with human adaptation to extreme factors of the environment. An introductory lecture was given by Professor S. Samuelov, a representative of the International Union of Physiological Sciences. Papers by Soviet and foreign specialists were devoted to various aspects of the study of physiological reserves of organisms exposed to environmental factors. Research which we are doing in Kirgizia aroused interest among our colleagues.

Early in October, the author of this article had the opportunity of taking part in a working conference of countries of the Council for Mutual Economic Aid (SEV), which took place also in Bulgaria. This conference, which was devoted to problems of work physiology, was sponsored by the Medical Academy of Bulgaria. The conference examined results of work during the past five years and outlined a plan of research for the next 5-year period.

A number of problems included in this plan are of definite interest to Kirgizia's economy, since scientists' recommendations will make it possible to maintain the health and high working fitness of those who work in conditions of high elevations. Our institute was invited to take part in drafting certain assignments within the framework of SEV.

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INTERNATIONAL SYMPOSIA ON AEROSOLS IN MEDICINE

Moscow VOPROSY KURORTOLOGII, FIZIOTERAPII I LECHEBNOY FIZICHESKOY KULTURY  
in Russian No 5, Sep-Oct 85 pp 71-72

TUREVSKIY, I. I., Ryazan

[Abstract] An abstract of two meetings is reported based on articles published in an East German journal "Zeitschrift fuer Physiotherapie". The first meeting on the use of aerosols in medicine was held 22-28 Mar 83 in Bad Saltzungen (East Germany) devoted to pathogenetic and pathophysiologic aspects of the therapy of bronchial asthma. The topics included diagnostic tests, principal aspects of therapy dictated by the extent and severity of the symptoms and comparative activity of several available drugs. The second meeting also held in Bad Saltzungen 22-23 Sep 83 covered three areas: use of aerosols in diagnosis, powder aerosols and determination of the effectiveness of the use of aerosols.

[1001-7813]

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MISCELLANEOUS

MICROBIOLOGY ADMINISTRATION MERGED WITH MEDICAL INDUSTRY MINISTRY

Moscow IZVESTIYA in Russian 22 Nov 85 p 4

[Text] In the Presidium of the USSR Supreme Soviet--The Presidium of the USSR Supreme Soviet has formed an All-Union Ministry of the Medical and Microbiological Industry of the USSR, on the basis of the USSR Ministry of the Medical Industry and the Main Administration of the Microbiological Industry of the USSR Council of Ministers.

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UDC: 612.395.12-08+613.22-07]:681.31

USE OF COMPUTERS TO STUDY ACTUAL NUTRITION AND HEALTH STATUS OF CHILDREN

Moscow VOPROSY DOKLADY PITANIYA in Russian No 3, May-Jun 85  
(manuscript received 28 Dec 83) pp 56-59

MOSTOVAYA, L. A., BUSHKO, R. P., RASSOKHAN, G. I., YAKOVLEVA, L. S. and BROVERMAN, L. L., Laboratory of Pediatric Nutrition, Kiev Scientific Research Institute of Nutritional Hygiene; Department of Algorithmization and Programming of Medical Programs; Computer Center, Odessa Oblast Health Resort Council

[Abstract] A method has been developed for studying the actual nutrition, health and physical development of children by the use of computers. This article discusses the method and previous developments on the use of computer technology in the organization of nutritional therapy. The use of computers allows a great increase in the number of children examined in groups, accelerating the processing of information and significantly increasing the accuracy and quality of results of processing. Children's diets were studied by filling out questionnaires on children in the first, fifth and eighth grades in Kiev and surrounding areas in the Ukraine. Some 4,000 children were studied in all. Programs and files used by the system are listed and described. A flowchart of the operations of the system is presented. The programs and data files can be used to study nutrition and health status of children of any age, as well as adults. Figures 2; references 9 (Russian). [072-6508]

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